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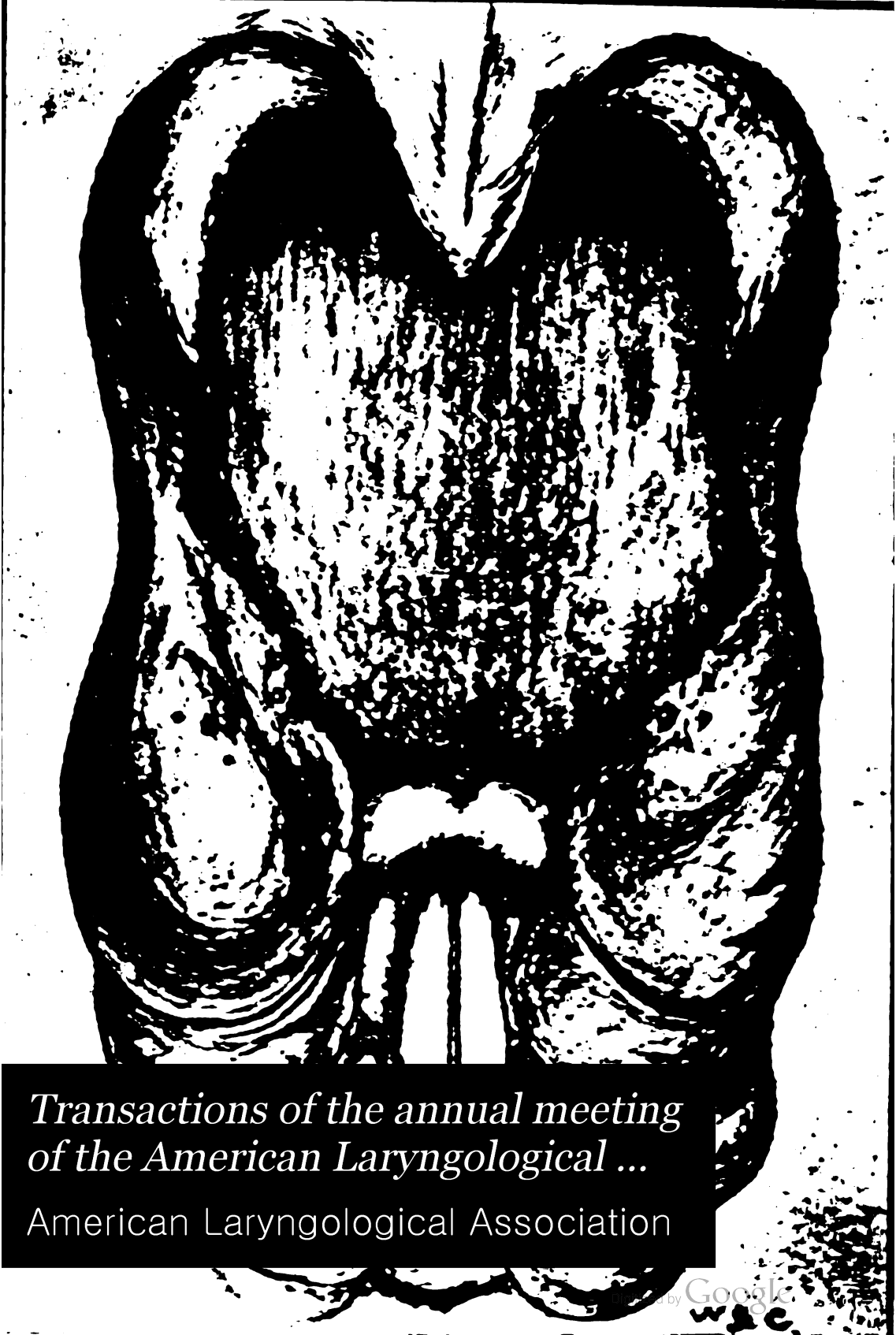

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American Laryngological Association

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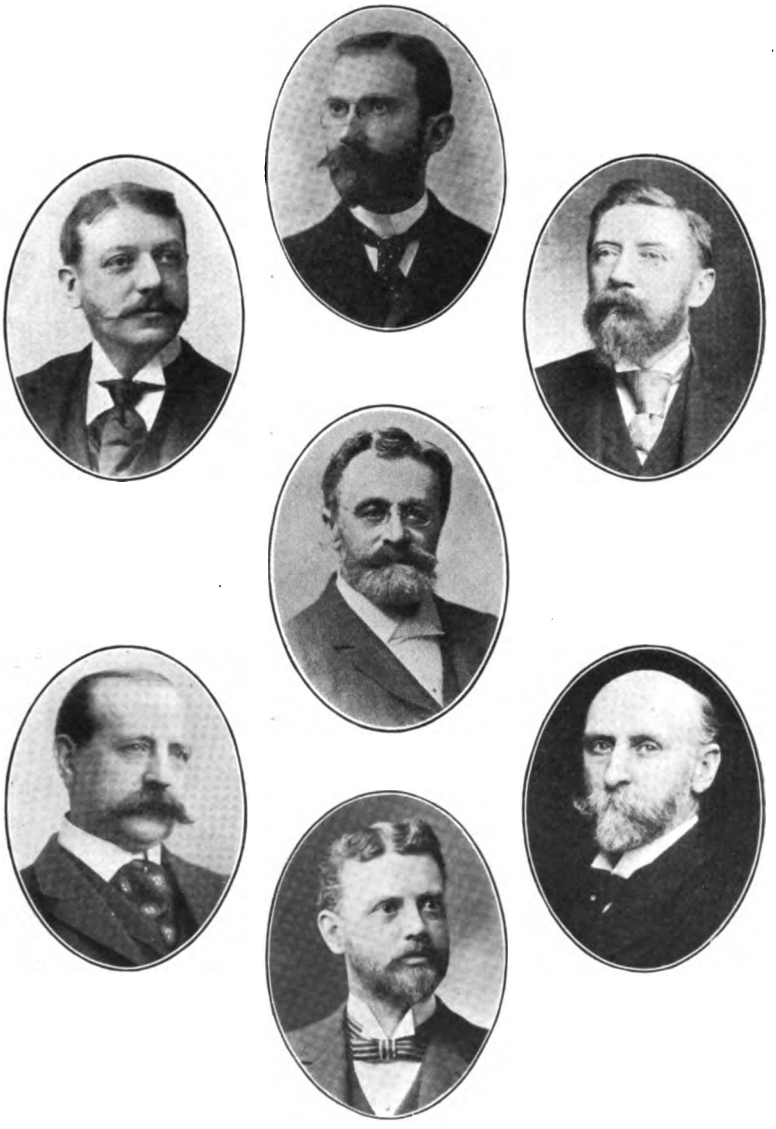

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TRANSACTIONS

OF THE

Thirty-sixth Annual Meeting

OF THE

American Laryngological Association

HELD AT

ATLANTIC CITY, N. J.

May 25th, 26th and 27th, 1914

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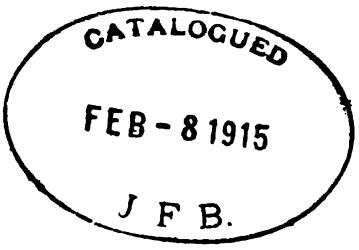

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TRANSACTIONS OF THE THIRTY-SIXTH ANNUAL MEETING OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION.

HELD AT ATLANTIC CITY, N. J., MAY 25, 1914.

THE PRESIDENT'S ADDRESS.

BY THOMAS HUBBARD, M.D.

Fellows of the American Laryngological Association:

May the wings of progress carry us onward, forward and upward, in all that pertains to the best in science, in ethics and in philanthrophy. Wisdom, purity, force and endurance are the essentials of progress. I would add to these inspiring words expressed by Dr. Delavan on presentation of this gavel to the association at our meeting in Philadelphia (1911) another sentiment. When Johnston gave us this token of presiding authority he beautifully exemplified that spirit of fellowship which gives life and perpetuity to organized professional endeavor. The pleasure of the giving was enhanced by sharing with his comrades, McKenzie, Hartman and Delavan the honors of the occasion. Read again those addresses, the cultured diction, the dignified courtesy, and the reverence for the association and you will have an ideal of the highest type of professional fellowship.

The weight of the responsibility of fulfilling the obligations of the office—wielding this gavel up to the standard implied in the words of Delavan, and exemplified in the records of predecessors—however great this responsibility, it is more than equaled by the honor of the position. You have in the strongest comparison that I can make my conception of the duties of this occasion and thereby I give to the honor its highest value. For this privilege you have my heartfelt thanks and the knowing that a true spirit of comradship permeates this body, a confidence in cordial support dispels embarrass-

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ment. I say this not only as an expression of personal feeling, but also as a word of encouragement to the initiates of this year. You have entered a group of generous hearted workers in a chosen art, and I know that you will grow to admire the high standard of loyalty to the best interests of our profession and active fidelity to the refinements of our special work.

Art is long. Our death roster bears witness. The workers who have passed away give us, by virtue of their strength and talents, a confidence that laryngology is well founded and enduring. Conceive for a moment the hopeless confusion without organization. Imagine the despair of inspiration and death of ideals without the privilege of professional exchange. Forget the kindly fellowship and mutual helpfulness and the community of well directed labor and all is an empirical chaos.

And what is the genius of an organization like this?

Turn your thoughts to the records and personal memories of the men whose names will be starred this year and you have three of the many types that make the association successful.

Shurley had ideals. Trained in the hard old school of experience and a tireless worker, he followed conscientiously every lead and kept well up in the ranks of progress. His zeal was fairly contagious and as he worked he gave inspiration, life and ambition to his colleagues. He was a contributor with power of induction.

Bliss had a more subtle influence. Earnest and modest and thoroughly analytical he gave to our meetings a scholarly tone. We shall miss this quiet gentlemanly associate.

Kelly Simpson. In him we recognize the type of loyal, conscientious fellowship which maintains a degree of working harmony that brings out the best that there is in us. He was the kind of reinforcement that holds the complex structure intact by virtue of strength and elasticity. His humor was genuine and every fellow a friend. We all feel a personal bereavement in the death of Kelly.

The three types—industry guided by intensity of purpose and unbounded enthusiasm, thoughtful observation and critical analysis stimulating scientific accuracy, and lastly, the spirit of comradship that draws us to annual conference, pre-

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vents disharmonies and gives us pleasure and contentment in our labors. By the talents and motives of such men the association is made useful and enduring.

I take this occasion to thank the members on behalf of the secretary and myself for the cordial support and many courtesies. Secretary Smith carries the burden of work gracefully and with extraordinary discretion. When you hear the report on the revision of the constitution by Dr. Coakley and the secretary you will realize the time and talent required to perfect the broad and permanent foundation for future development.

THE AIR WE BREATHE.—I venture out of the valley of tradition in selecting the subject matter for the conventional address and in so doing I sincerely hope that I may not be accused of setting a bad example. Our program is usually a model of concentration and this is one road to perfection, but if we are to keep in intimate harmony with the spirit of the times we must occasionally ascend the hills and take a broad look around.

Prevention of Disease is not a defined special art. It is a creed of medicine, and if you analyze your life's work you will find that you have the highest pride not in brilliant surgery, nor in invention or experimental research, but you will temporarily assume the patient's point of view and measure your efficiency by a broad standard of health conservation.

Laryngology is exalted in modern medicine in that its part in prevention is to protect the main portal of entry of the body. It is to-day a dependable guardian of the welfare of the child, and as such, duty fulfilled, it leads in health conservation. The brilliant results credited to our special art are in themselves evidence enough that we are doing foundation work; that is, correcting the strengthening vital functions.

Why do we devote so much of our thought and energy to attain right breathing? Bad breathing was formerly regarded more or less as a matter of inconvenience and an aesthetic offense, but to-day we realize that normal respiration is a dominant factor in development, survival and ultimate physical and mental efficiency. Man inhales thirty to forty pounds of air daily and actually absorbs more than two pounds of oxygen

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—more than total proteids ingested. Another index of the relative importance of the respiratory function is the fact that 80% of total food energy is used in heat production. Oxidation is the essential bio-chemical source of heat. Thus we see that respiration is main source of caloric energy, and this alone expresses its importance as a vital function. We are essentially promoters of right breathing.

Air is not exactly a commercial commodity, as is our "daily bread," but healthful air is not always to be had without taking thought and spending money as we do for "creature comforts" and that is precisely what we are called upon to do. The solution of the problem of ventilation, or more particularly the preparation ("conditioning" is the better term) of the air we breathe, awaits only the consensus of scientific advice, and ours the duty, a special duty, I should say, to not only help establish heat, ventilation and humidity standards but also to aid in educating public opinion. Architects and engineers are prepared to fulfill any reasonable demand.

Ventilation has reached a highly developed state and I mention it only incidentally as my theme is rather a consideration of *temperature, humidity* and *dust content.* We are concerned chiefly with the effects on the respiratory mucosa of these three varying qualities of the air we breathe, and we naturally give particular attention to the developmental period. The child spends all but a few hours of the day in the cold months within four walls, breathing air artificial as to temperature, humidity and dust content and the physiologic habits are formed in this environment.

Temperature.—Fire was man's first friend; that is, conservation of body caloric by artificial heat started the evolution of the higher nervous system, but, to carry this logic to an absurd extreme, one cannot say that mental precocity is in direct relation to the ingenuity in inventing and utilizing heating apparatus. Based on this theory the inhabitants of the Northern and Middle States might claim, for instance, that they are at least ten degrees more progressive than Europeans. Heating and ventilating contracts in public school buildings specify seventy degrees in America, and in England sixty degrees.

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They might raise the question as to which temperature standard favors the more rapid expansion of the intellect. Are we really ten degrees hotter on the trail of Truth?

It is interesting to follow the gradual change that has taken place in our country during the past half century in artificial heat standards. In 1820 American text books gave fifty to fifty-five degrees F. as the healthful, comfortable temperature of the living room and nursery (and I should add in passing that the natural relative humidity, taking into consideration the methods of heating (luminous heat and direct radiation, the open fire-place, ovens and the Franklin stove), would be about forty per cent. In 1850 the comfortable temperature was stated to be sixty-two degrees F., and in the next thirty years it was raised to seventy-two degrees F. Now, should we consider this seventeen degree change (fifty-five to seventy-two) a triumph of man's increasing dominance over the elements, or are we on the contrary seventeen degrees decadent in physical vigor? Our ancestors of two generations ago would have considered seventy-two degrees the proper temperature for the aged and infirm, but not for youth and vigor. This whole record is a commentary on ingenuity in invention and extravagance in burning up natural fuel resources. (The base burner and hot-air furnace were invented about 1840.) Again, I must mention humidity in this connection. The moisture in the air of a building at seventy degrees F. (this applies particularly to public school buildings and places of sedentary employment) would naturally be below twenty-five per cent relative. Therefore, if we were to state that in the period from 1825 to 1875, we reduced the standard of humidity from forty per cent. or fifty per cent. relative to twenty-five per cent. or less it would be a more significant fact from the hygienic standpoint than to call attention to the seventeen degrees increase in temperature during that period. In other words, we have worshipped a false god of comfort—Fahrenheit—and find him rather too mercurial to be dependable.

The difficulties of natural ventilation (that is, by windows, etc.) are immensely increased at the seventy degrees—twenty-five per cent. relative humidity standard. Drafts of outside

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air are unendurable because the velocity of the incoming air is in direct relation to the relative difference in temperature and further, the contrast in temperature, and particularly in humidity, is so marked that it produces real discomfort. A strata of cold humid air (eighty per cent. relative) of considerable velocity about the lower extremities produces a disturbing local chill and the rest of the body, including the nasal mucosa, is experiencing seventy degrees with twenty-five per cent. relative humidity. *The essential fact, to which all will agree, theoretically and from experience, is that a standard of seventy degrees* and *higher, with necessarily low relative humidity, makes efifcient natural ventilation almost impractical.* At a temperature of sixty-five degrees with humidity forty to fifty per cent. relative the perception of the drafts of natural (window) ventilation is less. It is not dependent on merely the difference of five degrees temperature. The water vapor in the air of the room is an equalizer of heat radiation. It tempers sudden changes. The figures, seventy degrees with twenty-five per cent relative humidity and forty degrees with eighty per cent relative humidity; that is, the room temperature and the inflowing air from an opened window, graphically express the complex disturbance (we may call it shock) of the heat regulating functions, the same having been made more delicate by being habituated to the hot, dry atmosphere. In passing I should mention that the hot air of our habitations has resulted in absurd fashions in the matter of protective clothing.

We should study *humidity* not as a secondary ingredient of the atmosphere but as an entity. Water vapor exists in the air not passively but positively. The vapor pressure of the air is as definite as barometric pressure. Air does not absorb moisture, but on the contrary its presence in the air varying quantities is dependent on the relative vapor pressure. In other words, dry air coming in contact with a moist surface becomes more humid because of the natural tendency to equalize vapor pressure and not because the air is hygroscopic in the same sense that is chloride of calcium. Keep that clearly in mind for this principle constitutes the difficulty in

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artificial humidification. As a matter of fact, there is no natural attraction between air and water vapor. Vapor diffuses more rapidly in a vacuum than in air. The terms "water hunger air," "dessicating air," and even "saturated air," are mere figures of speech, but they are convenient and rather indispensible terms in discussion of this subject and they should not be interpreted literally.

A few figures (not altogether dry ones) will illustrate the difficulties of maintaining a healthful degree of humidity in buildings heated to our present standard. But first a few words concerning *humidity standards.* This is a very broad subject if we attempt to consider it as applied in the industries and public buildings in general. It is better to limit the scope of the discussion to school buildings and dwellings and places of sedentary employment. The mechanical problems involved in artificially regulating indoor atmosphere are complex. It is impractical to attempt a perfect imitation of natural conditions. The consensus of opinion is that forty per cent. to fifty per cent. relative humidity is a healthful and practical compromise. As stated, the difficulty of proper humidification arises chiefly from the fact that the temperature standard is inordinately high.

Here are some of the figures: A cubic foot of atmospheric air can hold (100 per cent.), at 30 degrees F., 2 gr. of water vapor. At 70 degrees it can hold about 8 gr. of water vapor, an increase of about 6 gr. per cubic foot, and at 80 degrees about 11 gr. If we heat air of 30 degrees temperature, having 80 per cent. relative humidity (an average condition in cold weather), up to 70 degrees, its relative humidity drops to about 20 per cent. The problem presented is to add enough moisture to maintain 50 per cent at 70 degrees F. A nine-room house, cubic capacity about 30,000 cubic feet, air changed once an hour, about 20 times daily (the minimum rate of change consistent with warming it by indirect radiation), would require about 20 gallons of water to be added daily to the warmed air—about a gallon an hour. A very considerable amount; in fact, it would be quite impractical to evaporate this amount by natural methods, such as ordinary evaporating

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pans on registers and radiators. The evaporating pan heated by small calibre steam coils immersed in the water will impart to the air in the furnace or air ducts a sufficient amount of water vapor. This apparatus is used in large plants with forced ventilation. The evaporating pan has been successfully adapted to the hot air furnace, a large copper pan over the dome, the essential feature being a continuous automatic supply of water by gravitation from a reservoir outside the furnace. The objections to live steam as the source of humidity are the disagreeable odor and the noise. Its use is limited to large buildings. The humidistat is quite practical and satisfactory in control of the artificial humidifiers, especially the steam injector type. The atomizer type of humidifier is used successfully in certain factories. The air is first dried by freezing and then a definite amount of water is sprayed into the rewarmed air, maintaining any desired degree of humidity. But all this is for a visible profit and health conservation as a commercial asset cannot command such expenditure. It is evident that the whole problem of moistening the air to the healthful standard is made difficult and in many instances impractical by the unnaturally high temperature standard to which we have drifted. It is the last ten degrees that makes the trouble, and, by the way, we may add, the fuel expense of heating a building in cold weather from 60 to 70 degrees exceeds the total expense of raising the heat from 20 to 60 degrees F. *Sixty to* 65 *degrees is the "critical point" in heating air. Above that degree* (65 *degrees F.*) *there is positive resistance due to some peculiar physical quality of air, probably the low humidity* and the relative cost of heating the air and maintaining it at 70 degrees and higher increases in a geometrical ratio. It is a strange coincidence that this "critical point" should coincide with the teachings of hygiene and it is the standard of the greenhouse. One cannot but surmise that there is a fundamental principle which governs both. In both words, 65 *degrees is the natural maximum temperature considered from the physical, hygienic or economic standpoint.* These conclusions are worthy of consideration for ultimately America will awaken

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to the foolishness of extravagance and especially where there is involved corresponding health deterioration.

Ventilation standards for varying conditions—dwellings, school rooms, work shops and hospitals and assembly rooms —are well understood, and money is liberally and well expended in that line. It may seem exaggeration to assert that ventilation is ever overdone, but I think that a few illustrations will make it evident that in certain instances such is the fact. In hot-air furnace-heated houses and in all indirect heating systems the air of rooms must be displaced by incoming warm air from one to four times an hour to get the proper amount of heat. In cold weather the humidity of the warmed air is often below 20 per cent. relative. This is a sort of dry kiln effect, and the more rapid the change of air, the more ventilation, the more effective the dessication of all material objects in the house. Even the furniture and piano complain. I would assert boldly that it is less injurious from the health point of view to live in an atmosphere a trifle overcharged with carbonic acid gas and organic vapor having at the same time a healthful humidity, than to live almost continuously, as many do, in air having only 20 per cent. relative humidity and 70 degrees F. and even higher temperature, however low the percentage of vitiation. *There is such a thing as too much ventilation when the process is one of gradual reduction of humidity to a point far below the health standard.* In other words, carbonic acid gas and organic vapor are not the only ingredients which determine the unfitness of the air of our habitations.

A study of the relation of air conditions to diseases of the respiratory tract is strictly within our province, and I have selected this subject because this group of physicians is peculiarly qualified to express an opinion. It is a matter of verified observation that the cold months are productive of an increase of catarrhal affections, as well as all acute infectious processes of the respiratory tract. This prevalence of winter catarrh is not creditable, to put it mildly, and calls for consistent effort along the lines of rational hygiene.

It is not possible to make comparisons between this and

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preceding generations as to adenoids, tonsils and hypertrophied turbinates and catarrhal affections in general, but it is essential to inquire: Are we more sensitive to temperature variations and more subject to catarrhal affections than formerly, and are we making rational effort in the line of prevention during the developmental period when the catarrhal habit is established?

Let us take for example an average condition that obtains in the life of the child. It is fair to state that he lives in a temperature of about 70 degrees at least ten or twelve hours daily. (Bedroom hygiene need scarcely be considered. The fresh-air propaganda is working better at night than in day time. People who do not have fresh air in bedrooms are hopeless anyway.) During the cold months 70 degrees temperature implies a relative humidity rarely above 25 per cent, and it is positively sad to know that in many furnace-heated school rooms, as well as homes, the relative humidity is considerably below 20 per cent (14 per cent in one test.) The child habitually and many times daily leaves this unnatural atmosphere and immediately encounters a temperature of say 30 to 40 degrees with relative humidity of 80 per cent more or less. This feels like a cold, saturated serial blanket. There is a positive shock not only in general bodily discomfort, but particularly to the respiratory tract. The sudden demand on the nasal radiators produces a degree of reactionary hyperaemia that is almost inflammatory. One result of this is a chronic pathologic condition of the mucosa, abnormal anatomic relations and disturbed physiologic function. And worse than that—he gets it "coming and going." He enters this dry, hot atmosphere of the school room or home perspiring after the hurried walk, work or play, and the water vapor next to the skin diffuses into the air so rapidly that his skin is actually comparable to the wet bulb of the sling psychrometer; that is, several degrees colder than the actual room temperature. If he is a thoroughly wet bulb his surface may be as much as 10 degrees colder than the air around him. Even his skin chaps and his hands dirtier because of roughness are suggestive of the comparable condition of the upper respira-

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tory tract in so far as retention of catarrhal and saprophytic germs are concerned. This chill, due to rapid evaporation of moisture, is caused by the dryness of the room air, and it is the worst combination that obtains to disturb the heat control mechanism. The skin and nasal mucosa are the chief sources of the afferent warnings to the heat center and vasomotor system, and determine physiologic resistance to the shock of sudden changes of temperature. Hot dry air at the signal station—the nasal mucosa—and a wet, cold skin. An abnormal and the disturbing combination intensified and prolonged by the unnaturally rapid evaporation. The secondary effect of this condition is that type of nasal reaction which we encounter clinically—congested turbinates on entering a warm room. Chronic congestion of the turbinates is the result of these sudden changes from dry, hot air to cold, moist air and *vice versa*, and thereby hangs a tale. A very considerable proportion of our work on children and adults is the outgrowth, directly or indirectly, of this perverted and exaggerated functional activity; namely, hypertrophies to the degree of preventing nasal respiration, and the development of folds and pockets which are the source of cryptogenous infections, acute and chronic.

And what follows? Surgical correction of hypertrophied turbinates may restore the lumen to approximately normal but perfect functional harmony is not often secured. Certain it is that lacerated and scarred nasal mucosa has lost its keenness as a part of the signal system to the heat center, to say nothing of the destroyed glands, abnormal secretions and bad drainage. We have all had clinical confirmation of this fact. Patients with nasal passages made roomy by surgery who complain that they have not the normal sensation of nasal respiration. In these rather extreme examples of perhaps too radical nasal surgery we have an exaggeration of the condition which is liable to follow even conservative turbinal surgery. The individual who has lost in any considerable degree the delicacy of nerve function that is of utmost importance in protecting the body against vicissitudes of weather and sudden temperature and humidity shocks is seriously handicapped, and

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the recurrent acute as well as chronic catarrh is evidence of the degree of physiologic perturbation of the upper respiratory tract.

Dust and Droplets (minute particles of moisture) are the other ingredients of the air which should be considered in this study. Like water vapor dust is always present in varying degree. The atmospheric dust is as essential to life as is water vapor. "No dust, no rain," is the axiom, but dust can become a very deleterious ingredient of the air we breathe. We can consider bacteria and spores as dust in so far as air currents and moisture are concerned. Dust dissemination in the air of the room is determined by drafts and humidity. Desiccation destroys most bacteria rapidly but spores are more resistant. Elaborate and conclusive experiments with factory dust distribution prove that in a moist air (40 to 50 per cent. rel.) precipitation takes place very promptly. Thus we are forced to the satisfying conclusion that a healthful relative humidity lessens the liability of transmission of air-borne infections even though desiccative sterilization may be somewhat retarded thereby. Certain it is that a very dry air of high temperature with the certainty of the constant drafts resulting therefrom favors rapid distribution of dust and germs with corresponding liability of transmission of infection.

The propagation of air-borne infections of the respiratory mucosa is probably more dependent on coughing than any other factor in distribution. For instance, whooping cough. A very interprising germ, this. It tickles the phrenic and it is disseminated like pollen. The range of droplet infected air is a radius of twenty to ten feet fore and aft. Coughing is probably more harmful than careless spitting, for it starts active germs in circulation. If there is any one symptom that we study and treat in a radical manner, it is coughing, and we merit our claim to special service in prevention in part because we eradicate the causes. As with whooping cough so it is with all catarrhal infections. *Coughing is a menace.* Moisture free air is as a rule dust charged in that the available dust content is in circulation. Dry air is one of the irritants that excites coughing. The conclusion is evident.

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Moistening the air is a useful therapeutic measure. The psychrometer * is quite as essential as the thermometer in the promotion of health and comfort and in the study of the etiology and prevention of certain diseases. *"Conditioning" of the air we breathe should become one of the refinements of our special art.* Put a wet stocking on the other foot of old Fahrenheit and he will tell you some of the secrets of the invisible worth knowing.

In this discussion I have tried to impress the fact that the etiology of certain very prevalent acute and chronic diseases of the respiratory tract can be traced to the badly conditioned atmosphere of our habitations and above all I feel convinced that we are not giving sufficient attention to establishing healthful standards. The train of evils following such a national indiscretion is a long one. Neuroses, bad complexions, and even the absurdities in dress of this period are hot-house productions. We libel our climate by the tolerance of unhealthful artificial atmospheric conditions. *If a small portion of the present outlay in heat and ventilation were diverted to "conditioning" the air it would not take long to educate toward more healthful and more economical standards of artificial temperature and humidity.*

Examples in Humidification.

A nine-room house, cubic capacity 30,000 cu. ft., heated by direct radiation (stoves, radiators, and etc.), fresh air only by natural leakage, outside air 30 deg. F., 80 per cent rel. hum. would require the evaporation of about *eleven pints* of water daily to maintain 50 per cent rel. hum. at 70 deg. F. The same house and conditions would require *six pints* of water to maintain 40 deg. rel. hum. at 65 deg. F.

The same house, heated by indirect radiation (hot-air furnace), air changed hourly (about 20 times daily), outside air 30 deg. F., 80 per cent rel. hum., would require the evaporation of about *twenty gallons* of water to maintain 50 per cent rel. hum. at 70 deg. F.

* The sling psychrometer is used by the Government Weather Bureau Service in humidity tests. Most of the stationary humidometers are inaccurate and misleading.

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Temperature Shock Expressed in Humidity Contrasts.

(1.) Air, 30 deg. F., 80 per cent rel. hum., warmed to 70 deg., has 20 per cent rel. hum.

(2.) Air, 30 deg. F., 80 per cent rel. hum., warmed and humidified to 70 deg. F., 50 per cent rel. hum.

Note.—The average humidity of the cold months is near 80 per cent in the North Atlantic and Middle States.

The caloric shock experienced in passing from 70 deg. F., 20 per cent rel. hum., into winter atmosphere 30 deg. F., 80 per cent rel. hum., is chiefly dependent on humidity contrast. The higher the humidity of the warmed air (up to 50 per cent) the less the caloric shock. Examples:

Caloric shock (1) is represented by 80 minus 20 equal 60.

Caloric shock (2) is represented by 80 minus 50 equal 30.

The caloric shock experienced in sudden changes from artificial to natural atmosphere conditions and *vice versa* is the chief factor in the causation of so-called winter catarrh of the respiratory tract and the consequent anatomic abnormalities and physiologic disturbances result in permanent pathologic conditions.

Schoolroom Tests.

Sixty-eight deg. F., with 40 per cent rel. hum., feels warmer than 72 deg. F., with 20 per cent.

Sixty-five deg. F., with 40 per cent rel. hum., feels as warm as 70 deg. F., with 20 per cent rel. hum.

Sixty-eight deg. F., with 40 per cent rel. hum., represents 10 to 15 per cent saving in fuel, compared with 70 deg., 20 per cent rel. hum.

Conclusion: Establish a proper humidity standard and the temperature of our habitations will drop to a healthful degree.

Discussion.

Dr. Joseph H. Bryan, Washington: The President, in his very valuable and interesting address, has brought us face to face with one of the live questions of the day, and one which hygienists are working at most diligently, but as yet with no very definite results. To discuss the president's address from the floor is rather a novelty in this association, and Dr. Hub-

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bard has broken all precedents in asking that his address be discussed.

When I received the invitation to take part in this discussion I hesitated for many reasons, the principal one being that it treated of a subject which I am sorry to say I was not very well posted on. The difficulty has been with us who are physicians to postpone taking up this very interesting subject, contenting ourselves with treating the pathologic conditions that take place in the upper air passages resulting from vitiated air, rather than to educate our patients how to live in an atmosphere that is not only comfortable but healthful.

Some years ago when I was a surgeon in the navy and attached to the training ship Minnesota, I became very much interested in ventilation. I tried to make some observations as to the effect of vitiated air on the health of the crew of this ship. We were engaged in recruiting apprentices at the time, and the ship was very much overcrowded. Owing to the bitterness of the winter the recruits suffered intensely from the cold, and the consequence was that the ports were all closed and all crevices were stuffed so tightly that no air could get into the sleeping quarters of the men. The result was a most serious one, for we had an enormous sick list, consisting principally of those suffering from catarrhal conditions and pneumonia. Although only the junior medical officer at the time, I succeeding in persuading those in authority to open the ports and allow fresh air in the berth deck of the ship. The effect was magical, and the sick list was greatly reduced. We had no means at that time of making any scientific observations of the contained air, and had to be content with only the general results. To-day such a condition could not exist in our service. What applies to a ship holds good for a house, where only a few people are confined, as well as to public buildings and halls where a large number are frequently congregated. In order that health should be maintained at its standard we must have air. Man's necessity for air is urgent, and his welfare is intimately associated with the amount received and its purity. But that welfare is as intimately associated with the manner in which air is received, and upon its temperature and humidity. Now, from the chemist's standpoint, atmospheric air is composed of nitrogen, four volumes, and oxygen, one volume; anything else is vitiated or impure. To this should be added moisture in order that the air should be respirable.

What is the effect of humidity upon the human body? Should we have a high, low or moderate humidity?

The objections to a low humidity are a rapid evaporation of

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water from the skin and air passages when the tissues and the delicate mucous membranes of the respiratory tract are subjected to the drying process, for when there is little moisture in the air an increased amount of work is thrown upon the mucous glands in order to keep the membranes in a proper physiological condition. This increase in the gland activity causes a congestion of the membanes, enlargement of the glandular structure, and an increase in the interstitial tissues. It also lowers the vitality and resisting power of the body to the dust and germ-laden atmosphere, thus causing infections.

On the other hand, if it is too moist, the conductivity of the air is increased and infections are aided. A uniform, medium humidity is the best for health, authorities are not yet agreed as to just what the humidity should be. Parke says 80 per cent. From 40 per cent to 60 per cent is, I believe, the proper amount of moisture the air should contain. I believe this will be found to be the most comfortable, and also the most conducive to health. Anything above 70 per cent, and anything below 30 per cent. of moisture will, I believe, be found to be deleterious to comfort and health.

I agree with Dr. Hubbard as regards the temperature of our living rooms; 65 degrees seems to me the maximum—anything above that increases the sensitiveness of the individual. It is a notorious fact that we in America indulge in too much heat in our homes. The only other nation that lives in such hot houses is the Russian. Foreigners coming to this country to live for the first time almost universally complain of the great heat of our houses. Humidity and temperature are so intimately connected that they cannot be considered separately. As Dr. Hubbard says, a temperature of 65 degrees with a humidity of 40 per cent. will be as comfortable as a temperature of 72 degrees with a humidity of 20 per cent. These are simply opinions, and must be verified by more extensive observations before they can be accepted as a standard for the sanitary engineers to go upon in supplying our homes and public halls with the proper atmosphere.

In this connection it may be well to go into an article by D. D. Kimball, on "Ventilation," in the American Journal of Public Health, November, 1913, in which he says the much discussed question of humidity remains undetermined, although there seems to be an approach to an agreement that a relative humidity of less than 30 per cent. is injurious, and that a relative humidity of 50 per cent. is as high as desirable, although a relative humidity of 70 per cent. involves no harm. He quotes tests made at the Lewis Institute, Chicago, showing

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that when the relative humidity reached 25 per cent. the pupils were alert for the first hour, then became stupid. When the humidity was raised to 45 per cent. and 50 per cent. the efficiency of the pupils returned; when raised above this point the pupils again became stupid.

It may be interesting here again to refer to an experience I had when attached to the United States ship Miantonomah, a double-turreted monitor. This ship had a complement of fifteen officers and a crew of eighty men. We were ordered from Washington to New York, where the ship was to undergo alterations. On this trip, occupying six days, the temperature of the fire room was 175 degrees, the exact amount of humidity I have forgotten, as it was some years ago. Out of a crew of eighty men, forty were overcome by the effects of the heat and moisture, although they were worked in only hour watches. The effect of this high temperature and moisture was to produce the following results: High temperature, congestion of the conjunctivae and the mucous membranes of the air passages, and sharp intestinal pains. I sat in this fire room for half an hour, and taking my temperature immediately afterwards I found several degrees elevation. Some authorities say that an untrained man can bear in comfort a temperature of 75 degrees Fahrenheit and 80 per cent. humidity, only when he is quiet. The mere presence of carbon dioxide in moderate quantities in the atmosphere has no appreciable effect on the air passages, but serves to dull the sensibility of the individual. A dust-laden atmosphere, however, when we have a high temperature and low relative humidity, is undoubtedly injurious, although this is even denied by some authorities.

How are we to arrive at the proper conditioning of the air we breathe so as to produce an atmosphere that is conducive to health? It can only be done by the medical profession joining forces with the sanitary engineer. The engineer is prepared by the many devices at his command to produce any kind of air that is desired. He, however, has not been able to bring about the desired results because there is no uniformity of opinion in the medical profession as to what kind of air is the best for the health of the individual. We have been too slow to take up and investigate this most important subject. When this is done and a uniform opinion formed there then remains for us the all important duty of educating our patients how to live in a healthful atmosphere. This is not going to be an easy task, but I believe it will be lighter from now on, for the public is seeking information on this subject. When we have reached this all to be desired stage in our modern

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mode of life, we who devote ourselves to the treatment of catarrhal conditions of the upper air passages will have very much less to do, and may have to seek new fields of labor to occupy our pent-up energies.

Quoting again, from J. S. Lyle's interesting monograph on "Relative Humidity and Its Effect on Comfort and Health," it may be well to give here some of his conclusions.

He states, first, there is but little evidence to indicate with any degree of accuracy the most desirable humidity for health and comfort.

Second, low humidities are uncomfortable unless accompanied by high temperatures.

Third, low humidities are detrimental to health, (a) by affecting the mucous membranes of the upper air passages, lungs and eyes, and thereby reducing the resistance to infection by the bacteria to such diseases as tuberculosis, bronchitis, pneumonia and catarrhal inflammations; (b) by the increase in the amount of dust floating in the atmosphere carrying these and other injurious bacteria; (c) by irritating the nervous system through excessive dryness of the skin and excessive evaporation.

Fourth, unless special provision has been made in the construction of the buildings, high humidity in cold weather will be objectionable on account of excessive condensation running from the windows over the woodwork and wall decorations.

Fifth, in order to best satisfy these conditions in second, third and fourth conclusions, in cold weather, relative humidity should be maintained between 35 per cent. and 40 per cent.

Sixth, there is no evidence that observations have been made of the comparative effects by those who claim low humidities accompanying high temperatures to be preferable to high humidities with lower temperatures.

Seventh, there is evidence that the cooling of buildings by evaporation can produce conditions in the buildings more comfortable in hot weather than the natural conditions, although the wet bulb temperature is increased.

Eighth, that the determination within closer limits of the relative humidity and temperature best suited to the comfort and health of the greatest number of persons is of sufficient importance to require the study and investigations of physicians and scientists.

I am very much pleased that our president has brought this most important subject before the association for its thoughtful consideration, and I hope it will bear fruit and stimulate us to take more interest in the subject. My own feeling is that the proper way to approach this subject would be by the appoint-

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ment of a joint committee to be composed of eminent sanitary engineers and physicians, who would go thoroughly into the subject so that a definite opinion could be formed as to what is the best form of air conducive to health, and the best methods of producing such air. This having been accomplished, then every house should be supplied with a wet and dry bulb thermometer, and the people taught how to read these instruments and the importance of living a more rational life.

Dr. John F. Barnhill, Indianapolis: I think we all see a class of case, namely, one which cannot endure a temperature below 70 degrees without great distress. These cases have been, in my practice, usually those of ethmoidities; when they go into a lower temperature and are inactive they will have fits of sneezing, watery discharge, discomfort, cold feet, and distress in general. For a long time I thought possibly there was something psychic about it and tried to dissuade them from their feeling that high temperature was the proper thing. About two years ago, however, I began to have the same condition myself. When I would sit in a room having a temperature less than 70 degrees I began to sneeze, had discomfort, and all the symptoms which I have just related. I could not sleep in a room where the temperature was less than 65 degrees without waking in the morning with great distress. On examination by a rhinologist it was found I had small polypi and a beginning ethmoiditis, and when these were cured I could again live in a lower temperature without discomfort.

What saturation of air would Dr. Hubbard advise for this type of patient?

Dr. Henry L. Swain, New Haven: I think we are greatly indebted to Dr. Hubbard for having brought this paper before us, because I for one have never put one and two together in the interesting way in which he has this morning, and I had a question in my mind similar to that asked by Dr. Barnhill. What shall we do with just the class he speaks of? I have another question I would like to put to Dr. Hubbard. I do not understand which method he recommended for bringing up the humidity of any given house or room to a desirable state. It must be what he says is true because if we are thus stimulating the physiological function of our nasal mucosa, outside for warming, and inside for both warming and moistening the air to our lungs, we must be making a physical stimulus sufficient to intensify any tendency to hypertophy in such a nose.

Although this is not germane I have often wondered how an atrophic rhinitis patient warms and moistens the air.

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I do think we do not know enough about this subject, and I hope we can in some way get together a combination of information and work and study and investigation which will put us on the proper level of things in regard to the whole matter.

Dr. Charles W. Richardson, Washington: I think it is delightful that our President has brought this subject before us for consideration. Some of us have thought about it a good deal. Some years ago I talked to the chief of the Weather Bureau and he brought to my consideration the question of increasing the humidity and lowering the temperature as being the most comfortable for living purposes. He explained it so thoroughly and satisfactorily that ever since then I have been having my operating room uniformly at 60 degrees with 40 per cent humidity. There is one thing in that connection I would like explained. It has been a question with me whether I should not increase the temperature a little, for I find that most of my patients, or at any rate a number of them, speak of the coldness of my hands. I feel perfectly comfortable, not at all cold. I never have any affection of my upper air tract. I think another interesting point brought is the cry of nature against this lowered humidity and high temperature. I have always had a hobby for old furniture, and, as you know, a great deal of that is not nailed but riveted with wood and glue; and I have often noticed when our temperature was high how we could hear it crack and warp. The joints would open up. But since we have been keeping the temperature lower and the humidity higher this crackling has ceased.

These are interesting points and instructive ones, I think.

Dr. Emil Mayer, New York City: I would like to ask a question of Dr. Richardson. What effect do your patients find in coming into a room kept at 60 degrees when they are not accustomed to it?

Dr. Richardson: Some complain about it, I must confess.

Dr. Thomas Hubbard (in closing): In regard to Dr. Bryan's conclusions that 40 per cent to 60 per cent relative humidity is the healthful standard, I think most engineers agree that anything above 50 per cent is impracticable. Condensation of moisture on windows and in cold weather, the frosting, must be taken into consideration. It should also be mentioned that when the occupants are undergoing physical exercise they can stand only from 45 per cent to 50 per cent. The discomfort of foreigners is due in part to the change in humidity, not alone to the high temperature. I want to emphasize the fact that the indirect system of ventilation—

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hot-air furnaces, etc., is largely responsible for the low artificial humidity; the colder the weather the less absolute moisture in the fresh air you take into the furnace. The more rapid the change in the air of the house to get heat the more rapid is the lowering of the humidity percentage. The best modern system is a combination of direct and indirect, direct to heat of the room, and the indirect for a moderately rapid change of air of the room.

Dr. Barnhill's case which had symptoms of sneezing, etc., in an atmosphere below 70 degrees is very interesting. It is impossible to attempt to study this question from the individual standpoint at this time; it must first be studied from the broad standpoint of the average.

Dr. Swain's inquiry concerns methods of humidification. I simply mentioned in passing that it would require a separate consideration to do justice to this subject. Perhaps at some future time we will take up the description in detail of methods of humidification. By another year we will have some more definite information upon this subject.

With reference to Dr. Richardson's statements, I would consider that 60 degrees, even with a humidity of 50 per cent, is too radical a change for most of us, because we are so long accustomed to 70 degrees. Ultimately we will regard 60 degrees as a desirable standard just as now we consider 65 degrees, but at present 70 degrees to 60 degrees is too sudden a drop, and would cause more or less positive physical discomfort. The fact that we do abuse our furniture, pianos, etc., is worthy of notice, because in just that degree we are abusing our dear selves. Creakings and discords and weeping tissues are a protest against dry kiln habitations.

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INTRINSIC CANCER OF THE LARYNX.

COMPLETE EXCISION APPARENTLY EFFECTED BY ENDOLARYNGEAL OPERATION.

BY SIR St. CLAIR THOMPSON, M.D., LOND.; F.R.C.S., LOND.; F.R.C.S., ENG.

The treatment of intrinsic cancer of the larynx by laryngo-fissure is remarkably satisfactory. It is doubtful if the results of operation for cancer in any other part of the body can surpass those I have already published.[1] Since giving full particulars and showing cases before the Medical Society of London in 1912 I have continued to obtain the same results—*i. e.*, no patient has been lost by operation, and 80 per cent. have remained free from recurrence. This freedom from recurrence dates back in some cases for 10 years. The same proportion of lasting cures was obtained by Semon, who did so much to popularize laryngo-fissure in these cases, and similar records were secured by Butlin, who revived the operation after it had been quite discredited both in this country and abroad. Possibly it is because these excellent results were first obtained in England that we, in this country, have come to look askance at any other route for removing an endolaryngeal cancer except that obtained by splitting the larynx. We are even a little sceptical accepting the records which claim permanent cures by operating through the mouth, yet such cases have been published by several eminent authorities.[2]

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[1] Brit. Med. Jour., Feb. 17, 1912; The Lancet, Feb. 24, 1912, p. 504.

[2] B. Frankel: Deutsche Medicinische Wochenschrift, xv., 1889, Nos. 1 to 6, S. 1 to 109; Archiv fur Laryngologie, vi. ii., 1897, S. 361 to 374. Arslan: Archivi Italiani di Otologia, xii., 1901, fasc. 2; Annales des Maladies de l'Oreille, xxx. i., Fev. 1904, p. 130. (Gives an analysis of recorded cases. Two personal cases, confirmed by the microscope, remained well after 4 years and 20 months respectively.) Finder: Journal of Laryngology, vol. xxv., 1910, No. 11, p. 602.

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Fig. 1.

Malignant growth of the right vocal cord.

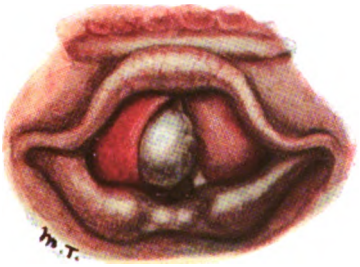

Fig. 3.

Granuloma following removal of malignant growth of right vocal cord.

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Among my recent cases it has been my good fortune to obtain, in a curious way, the definite proof that an intrinsic cancer of the larynx can be completely removed *per vias naturales*, But I hasten to add that the completeness of removal was unintentional, and that I do not for a single moment suggest that excision of a cancer of a vocal cord should ever be confided to the laryngeal forceps. On the contrary, this very case which I am about to relate gives the strongest proof of the desirability and hopefulness of treating intrinsic laryngeal cancer by opening the larynx from the outside. It was the first case of endolaryngeal cancer which I have handled in a woman; all my other cases were males.

The patient, a woman, aged 53, had been hoarse for eight months, when she was sent to me at King's College Hospital, on October 12, 1912, by Dr. R. H. Shaw, of Great Yarmouth. The right vocal cord from the anterior commissure back to the vocal process was replaced by a reddish, cauliflower growth. (Fig. 1.) This somewhat interfered with the movement of the cord, but its intrinsic mobility was not impaired. There were no enlarged glands, and the case was evidently a very suitable one for operation by laryngo-fissure. The Wassermann reaction was negative and the chest was healthy. As the growth did not infiltrate the cord to any great extent (as shown by the persistence of mobility), and as it projected well above the surface, I decided to remove a portion so as to confirm the diagnosis by microscopical examination. With the aid of cocaine, and using a large-sized duck-billed forceps of Morell Mackenzie (Fig. 2) with the indirect method, I seized as large a piece of the cord as possible, and, finding it very tough, I removed it by avulsion. The toughness and naked-eye appearance were confirmatory of my diagnosis of malignant disease, and the following report on the removed tissue was kindly furnished by Dr. W. d'Este Emery:

"The material is an irregular mass about 9x5 millimetres. It is divided into two parts, of which one consists of papillomatous and epitheliomatous tissue, with a very small amount of fibrous stroma which shows evidence of subacute inflammatory changes. The large portion consists of a firm, fibrous basis. On one edge there are some mucous glands. On the

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other two unattached edges there is a margin of epitheliomatous tissue, which in places is inflamed and ulcerated. The epithelioma in this section is a typical one, but shows little keratinization. There are a few imperfectly formed cell nests, and some so-called 'cancer parasites.' ''

On November 28, 1912, anaesthesia was induced by intravenous infusion of ether and hedonal. The usual laryngo-

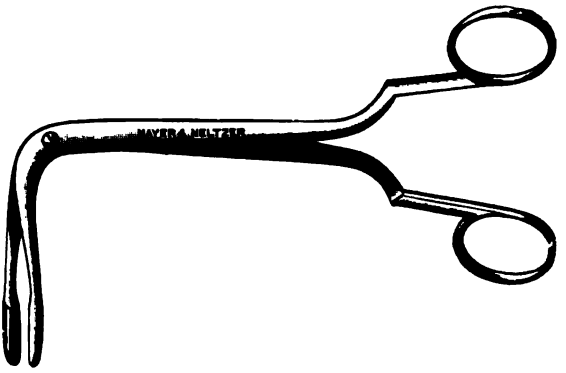

Fig. 2.
Morell Mackenzie's duck-billed laryngeal forceps.

fissure operation was carried out; no Hahn's tube was used. The remains of the right cord and the ventricular band were dissected up with their perichondrium from the inner surface of the thyroid cartilage and removed *en masse,* together with the vocal process of the arytenoid cartilage. The tracheotomy tube was removed before the patient left the table. The patient would have been allowed up the next day, but she was exceedingly drowsy from the hedonal and could hardly be roused. However, within 48 hours of the operation she was sitting out of bed and taking solid food. She returned to the country a fortnight after operation.[1]

The tissue removed by laryngo-fissure was submitted to Dr. Emery, who reported on it as follows:

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[1] The patient was shown before the Clinical Section of the Royal Society of Medicine on February 14, 1913, and before the Clinical Congress of American Surgeons (in London) on July 29, 1914.

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"The specimen is of an irregular shape, the longest dimensions being 19x10 millimetres. The base consists of striped muscle which is inflamed and oedematous; some mucous glands occur in the lowest portion. Above this there is a layer of organizing granulation tissue in various stages, but there is no epithelial covering. Mucous glands, normal or slightly inflamed, are scattered throughout the section, and at one end there is a triangular piece of cartilage about 2½ millimetres long. There is no sign of epithelioma or other malignant disease in any other part of the section."

This report brings us to the instructive conclusions which may be drawn from this case, and, to be brief, I will simply state them in order:

1. Cancer of the vocal cords is, in early stages, a very slowly progressive and strictly limited process. (N. B.—In this case hoarseness dated from eight months, the cord was still quite mobile, and the disease was still superficial.) Alteration of voice is the principal, and may be the only, symptom. Persistent hoarseness in any patient calls for a definite diagnosis.

2. Diagnosis is based chiefly on inspection of the larynx. Only in certain cases, where the growth is a superficial and not an infiltrating one, can it be confirmed by microscopical examination.

3. The growth, even when it occupies almost the entire length of a vocal cord, can sometimes be completely removed by endolaryngeal operation in early cases. But this completeness can only be ascertained when, by laryngo-fissure, the remains of the vocal cord and adjoining soft parts have been removed and submitted to the pathologist.

4. Laryngo-fissure is, therefore, the operation of choice in all cases of endolaryngeal cancer.

5. The operation offers the very best prospects: First, because the disease remains for some time superficial and limited, and secondly, because laryngo-fissure cannot be considered a dangerous operation.

6. Statistical results show a lasting cure in 80 per cent. of cases, and if all cases presented themselves and were diagnosed

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early there is no reason why the results should not be even more satisfactory.

My patient is in good health, with a useful voice, and has no recurrence at the present date—that is, one and a half years after operation.

I have already confirmed the opinion originally enunciated by Semon, that if recurrence does not take place during the first year after operation there is every prospect of permanent cure.

Addenda.

In addition to the six conclusions I have tabulated above this case suggests three other points which, I think, are very interesting:

(a) *Regrowth.*—Towards the end of January, 1913—*i. e.*, two months after operation—the patient began to show symptoms of what many would have taken to be a recurrence of the growth (Fig. 3). But I had no anxiety myself, partly on account of the above negative report from the pathologist, but chiefly from experience with previous cases in which a regrowth during the first two months nearly always proved to be a simple granuloma. In this case the fresh neoplasm was removed entire through the mouth, with the same Mackenzie forceps and by indirect laryngoscopy, and was found to consist of simple granulation tissue, showing no epithelioma or sign of malignant disease in any part of the section. The moral of this is that a regrowth, in early days, after a thyrotomy for cancer is not necessarily malignant.

(b) *Value of Indirect Laryngoscopy.*—The case shows that a considerable growth, indeed, practically an entire vocal cord, can be removed with one bite of the forceps used by the indirect, or, as some already call it, the "old method" of laryngoscopy. As I have practiced Killian's direct laryngoscopy for 11 years I feel equally skilled with both methods and each method has its own well-marked indications. I very much doubt if the most expert endoscopist could have removed as large a growth as I did in this case, and certainly it could not have been done more quickly or less disagreeably.

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The indirect method allows of the forceps being sloped to the opposite side of the body, so that any growth on a cord can be more cleanly and completely seized than is possible with the limited action of cutting forceps working in a circumscribed circular tube. The importance of removing as large and intact a portion of growth as is possible is of the highest value when it is desirable to submit a suspected neoplasm to the microscope. It will be a loss to laryngoscopy, and to our patients, if the rising generation of throat surgeons neglects to acquire the gentler art of indirect laryngoscopy and limit themselves to the easier but rougher technique of direct examination.

(c) *Anaesthesia.*—Laryngo-fissure can be well carried out under local anaesthesia. I have employed it in one successful case, but I doubt if many of our sensitive patients in this country would submit to the moral ordeal. In the above case the operation lasted 85 minutes. Anaesthesia was induced by a mixture of one ounce of ether and twenty grains of hedonal to a pint of normal saline solution, the object of the hedonal being to diminish as far as possible the total amount of fluid passed into the circulation. Two pints and six ounces of this mixture were used, corresponding to two ounces, two and one-half drams of ether and 46 grains of hedonal, including a certain amount of wastage. Probably two ounces of ether and forty grains of hedonal were infused through the internal malleolal vein, just above the ankle. As administered by Dr. J. F. W. Silk, the resulting anaesthesia was, from the operator's point of view, ideal. The field of operation was quite clear of the anaesthetist and his paraphernalia, and the patient's sleep was tranquil and even. But the profound sleep in which she continued to be plunged next day gave me some anxiety. For twenty-four hours it was difficult to rouse her, and I thought what a serious condition might have arisen if, peradventure, she had inspired any blood during the operation and we had wished her to cough up the resulting bronchial or pulmonary catarrh. I would suggest that in future cases the hedonal be reduced to a minimum, if it cannot be dispensed with.

In another case I had there was some thrombosis of the

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lower part of the internal saphena vein, and this kept the patient in bed when he ought to have been up and about. Besides, I am not quite sure whether it is wise to flood the circulation with over two pints of liquid, and it is difficult to keep within this limit unless some such drug as hedonal be employed with its corresponding tendency to prolonged and profound after-sleep. Any how, the method of anaesthesia by intravenous infusion of ether has not yet established itself, in my opinion, for these cases and it still requires consideration. In my more recent cases I have returned with satisfaction to the use of chloroform employed in the usual way.

Discussion.

Dr. Charles W. Richardson, Washington: I have been very much impressed with this paper. The laryngo-fissure claims to have its origin from Dr. Sanger, of Berlin, but the first I ever heard to mention this method of removal of laryngeal growth was Dr. J. Solis-Cohen. Whether he is the originator of it he can tell us.

This method of operative intervention impressed me very much when explained by Dr. Cohen, and I have resorted to it in a number of cases. One case which I have had is now five or six years old, without any recurrence. I have not been so fortunate with some of my other cases. Most of my others have had recurrence, but singular to say, only one of a recurrence in situ. There were secondary developments in other portions of the body to which they have succumbed. I have had two cases this winter. One that I operated on, in the latter part of November or December, and as I had to go down quite far into the cricothyroid membrane in order to insure absolute removal into normal tissue there has resulted some stenosis. This has been intensified by the fact that I had a hemorrhage the night of the operation; not a very severe one, but a persistent oozing in the lower corner between the arytenoid and the lateral wall of the thyroid cartilage, requiring opening up of the wound and watching the hemorrhage for some little time. Neither forceps nor any other method I could adopt were effectual. It persistently oozed; so as a last resort I had to use chromic acid which also produced considerable softening and necrosis of the left wing of the thyroid cartilage, which no doubt has added to the stenosis. The patient is still alive. He is wearing an intubation tube and is perfectly comfortable.

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The second case of this year is very interesting. It was identical with the first, and there was an identical hemorrhage which was controlled much earlier than in the first case; the same resident interne had the two cases and he did not allow the bleeding to persist so long before notifying me. After I had controlled the hemorrhage, and waited about half an hour, I returned to the man to see if he was perfectly safe to leave, and I found that he did not seem to recognize me, or show any interest in anything. In picking up his hand to feel his pulse I noticed the left arm was apparently inactive, and testing further I found the left arm and leg both inactive; the right side was free! Three or four days later he died from his hemiplegia; no post-mortem was obtained. He was a man of 70 years and probably this was a natural sequence in such a case. All of my cases I have operated on without primary tracheotomy, simple laryngo-fissure, according to the technique suggested by Cohen, splitting the larynx and making the muco-perichondrial separation as far back as the growth extends in every direction and cutting away the mass. One accustomed to submucous operations will find this easy, and it offers a great feature for cases of this kind.

Both of my cases of this year were seen by Dr. McKimmie; the last case was most interesting because the growth was all subchordal apparently, and did not bear the physical earmarks of a malignant growth excepting that it was a new growth in a man of 70 years, with hoarseness which had existed for six months. There was a question as to the correct diagnosis.

I want to echo the words of Sir St. Clair Thomson with regard to the indirect method of operation in these cases of removal of a portion of the growth for examination, and I feel as he does that it will be a misfortune to the younger laryngologists if they lose the tactile facility required for indirect laryngoscopy.

Dr. J. Solis-Cohen, Philadelphia: I have done a number of these operations and have never seen a recurrence. I learned to split the larynx from our old member, Ephraim Cutter; I saw him in Boston take out a large epithelioma in 1867. My first patient lived for twenty-five years and died of apoplexy.

My operation differs a little from Dr. Thomson's. I cut down, make the incision through the perichondrium all around the growth, and then with a blunt elevator lift the parts up. Then with a curved serrated scissors the whole mass is taken up, perichondrium, mucous membrane and growth, and the growth itself is not touched at all with any instrument. I have done preliminary tracheotomy in my earlier operations,

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but I have done one or two cases without. I prefer preliminary tracheotomy because I think it is well to get the patient accustomed to the use of a tube in case this becomes necessary later. All my operations were performed under chloroform.

I heartily endorse the conclusions that have been presented in the paper, both as to the ease with which certain classes of growth are removed by intralaryngoscopic method and the conclusions that have been arrived at by the writer.

Hemorrhage has been insignificant in my cases.

Dr. Emil Mayer, New York City: As a new contribution to the question of anaesthesia I would like to call attention to the anaesthesia proposed by Gwathney of the injection of ether into the intestinal canal, producing a perfect anaesthesia, the excess being drawn off after the operation. This is still in its infancy, but is very well spoken of and it may be possible that in this we have a newer method of producing anaesthesia, avoiding the necessity of a preliminary tracheotmy and operating under ether.

Dr. D. Bryson Delavan, New York City: I approach this discussion with great respect because I believe Sir St. Clair Thomson is the ablest exponent of this operation in Europe to-day. I am happy to know that America is still in the lead as to the subject of thyrotomy, but it is only necessary in proof of this to mention the name of Clinton Wagner, whose cases in the eighties show a comprehension of the subject and success in relation to it which is deserving of recognition to-day. The reading of his articles will give much valuable knowledge. With regard to the recurrence of malignant disease after operation, I have seen several cases in which it has taken place. I have the history of one case in particular, of primary epithelioma of the epiglottis, in which the disease was apparently thoroughly removed. The patient lived for nine years without recurrence; then it took place and he succumbed. The fact that in many cases recurrence does not take place cannot insure a given patient against it. Where it would be most likely to occur is in the cases that have not been appreciated as of the severe type, or else when the operation has not been thoroughly performed. In the main my experience has been such as that stated in the paper and by Dr. Cohen.

Dr. T. Passmore Berens, New York City: In order to lend emphasis to two points of Sir St. Clair Thomson's paper I desire to call your attention again to a case that I reported in *The Laryngoscope* for October, 1910. This was a case of carcinoma on one vocal cord, which I removed by the indirect method. Believing that I had not secured the whole growth I performed a hemilaryngectomy. Microscopic examination

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of the tissue removed during the hemilaryngectomy proved that I had secured the whole growth by the indirect method. Incidentally, the case has had no return, is speaking in a fairly loud voice and has no difficulty in telephoning.

The direct method is certainly a great advance over the indirect, but I cannot urge too strongly the value of the indirect method in selected cases.

Dr. Greenfield Sluder, St. Louis: I would like to add a word in the form of a plea for the indirect method. I personally regret exceedingly to hear it spoken of as a lost art. It seems specifically a part of our skill. We should be able to slip a naked instrument into the larynx and remove what is on the free edge of the cord without the punishment of direct methods.

Dr. Harmon Smith, New York City: I think we are greatly indebted to Sir St. Clair Thomson for his kindness in giving to the association the history of this peculiar and interesting case. The features making this unique are the comparative early age of the patient, its occurrence in a woman, the removal of the entire growth by accident, the employment of the indirect method for removal, the subsequent appearance of a granuloma which might have been mistaken for recurrence of the malignant tumor, the absolute faith of the operator in the pathological report that the malignant part had been entirely removed, and the final disappearance of all neoplastic laryngeal involvement. These factors, standing out as they do prominently in the history of the case, render it one of the most unusual that has been presented to us for consideration.

Dr. John N. McKenty, New York City: It seems to me, so far as my experience goes, that in small unilateral growths of the larynx laryngo-fissure is sufficient, but where the growth is at all progressive or extensive or growing fast, I am in favor of removing not only the growth but the cartilage underlying it, either taking a wide section out of the larynx or doing a hemilaryngectomy. I do the tracheotomy and the hemilaryngectomy at the same time, and in that way may probably be going against the experience of others, as it is generally considered better to do the tracheotomy first, but if the tracheotomy is done through a small incision just above the suprasternal notch and the laryngectomy through an incision which does not connect with the fissure below, there is not much trouble. Another point (to prevent inhalation pneumonia) is that after doing the hemilaryngectomy I pack the trachea tight down upon the tube with vaselined gauze im-

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pregnated with bismuth, then I use a small drain into the larynx brought out at the lower corner of the laryngo-fissure wound. In that way the larynx is drained of secretion and this secretion is prevented from getting into the lung and causing pneumonia. I do not believe the position in bed is sufficient to prevent this when the larynx is closed after hemi-laryngectomy. The drainage is removed from the larynx in two days, and the gauze packed down on the tube is removed also, and the tracheal tube taken out four days after the operation. I have had four cases (prior to two recent ones of which I will not speak), in which the patients made excellent recoveries, and have been able to talk in a loud whisper. I think we ought to be very proud of the fact that Dr. Solis-Cohen has opened the way of doing laryngo-fissure and has given us this excellent operation in cancer of the larynx. Anything that will avoid total laryngectomy is a Godsend. I saw in clinics abroad two years ago thirteen total laryngectomies, and the patients were in many instances in a pitiful condition, though the operations were all successful so far as the immediate result was concerned. The Gluck operation was done, but the pathetic condition of the patients impressed me that life would hardly be worth living after a total laryngectomy. If we can get results by an early operation, such as Solis-Cohen and Sir St. Clair Thomson have told us of, we will be very glad to adopt these methods instead of the more radical ones.

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THE ENVIRONMENTAL SURGERY OF OTOLARYNGOLOGY.

BY JOHN F. BARNHILL, M.D.

In Beverley Robinson's work on "Nasal Catarrh," issued in 1880, he states in the introductory chapter, "I can believe but few amongst the most favored have seen and treated more than one case, here and there, of suppuration of the frontal sinus, or rare tumor of the brain."

He makes mere mention, only, of the fact that suppuration may occur in the maxillary or sphenoid sinus, but no intimation whatever is given that suppuration or other disease of the ethmoidal cells ever takes place. The treatment of nasal disease advocated in this book consisted chiefly in the use of nasal douches, powders and general medication, but a brief description is given of procedures for removing polypi, cauterizing thickened nasal tissues, or for tearing the same away when too much thickened to yield to milder measures.

In the same year Buck issued a splendid treatise on the ear, abounding in excellent descriptions of the symptoms and course of aural affections. The chief operative measures advocated by him in this work are the removal of polypi, incision of the drum head, and the cautious opening of the mastoid antrum by means of a bone drill. In neither of these representative texts of one-third of a century ago is there more than the slightest reference to intracranial complication as a result of suppuration in the nose or ear. There is of course no bacteriologic teaching, and there are no references to involvement of the venous sinuses, to orbital complications, to transference of infected materials to the cervical lymph nodes, to the infective and pressure disturbances of the fifth nerve and its ganglia, or to any of the many other diseases of the head and neck which are to-day known to originate in the upper air tract with great frequency. The practice of otolaryngology in those days was indeed simple, and was therefore more easily limited

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to very definite anatomical fields than is to-day at all advisable. Hence opinion as to what constitutes the proper surgical limitations of the otolaryngologist of to-day is vastly different from that held in the early period of the specialty. At that time the view seems to have been that the nostrils formed chiefly the anatomical limits of the nose, the tympanic cavity and Eustachian tube were considered the principal structures of the ear, and the opinion of specialists of that day must have been that there was little outside the oro-pharynx and larynx the disease or treatment of which should interest or belong to the specialist in laryngology.

Comparatively little was written in these days concerning the diseases or surgery of the accessory cavities or of the other intimately related environmental structures of the nose, throat and ear, which neighboring structures we now regard, in a large number of instances at least, as of more importance, judged from a pathological and surgical standpoint, than are the nostrils, tympanum and larynx themselves. Since later investigations have proven that nasal diseases are not often limited to the nostrils, aural diseases to the tympanic cavity or laryngeal affections to the larynx, and since their environment—the meninges, the ganglionic structures, the arterial, venous and lymph vessels, the lmyphatic glandular system, and, in brief practically all the structures of the head and neck are often more the seat of disease than are the classical, but vastly more simple cavities of the nose, throat and ear as formerly understood, the limitation of the surgical aspect of otolaryngology has necessarily widened until it has in recent years often been difficult to define, its boundaries have needed frequent revision; each new adjustment has included some new anatomical field until now it would seem that no rational limitation can be placed which does not include the surgery of the whole head and neck. Dr. Joseph Beck, of Chicago, has advocated this widened scope in the surgical practice of the otolaryngologist. In an address before the American Academy of Ophalmology and Otolaryngology in 1908, he enumerated eleven reasons why this type of surgeon should include in his operative practice the environmental surgery of the ear, nose

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and throat. Beck then stated that it was his opinion that those sufficiently trained in surgical principles and operative practice should undertake the surgery of the mouth and lips—cleft palate and hare lip—the surgery of the brain, in so far as the brain disease has been caused by nasal or aural affections, excision of the superior maxilla, removal of enlarged and diseased cervical glands, goitre, the external operations of the larynx, esophagoscopy and bronchoscopy, and nerve splicing when required to cure facial palsy. The reasons given for the performance of these operations by the laryngologic surgeon were that such an operator is presumed to know the anatomy of the parts better, and his skill in handling delicate instruments and reflected light should enable him to excel in this class of surgery.

I heartily approve of Doctor Beck's conclusion and believe that the best interests of all concerned will be served should we now look upon it as a settled fact that the surgical treatment of diseases of the entire environment of the ear, nose and throat, lies ethically and therefore rightfully in the domain of the otolaryngologist. I would not, of course, advocate that all who practice otolaryngology should undertake to perform the many difficult surgical procedures required in operations on the head and neck. It would seem, rather, that there should occur some line of cleavage in the ranks of our specialty that would be both natural as to the qualification of the individual, and advantageous to the standard of our work. It is entirely probable that not all, or even any considerable percentage of all who practice the specialty would profess sufficient qualification to undertake this major surgery, much of which is the highest type of all surgery, but to those who have had the rigid necessary surgical training, and who are willing to devote their entire time and energy to anatomical study and surgical progress, it would appear that their experience and training through all the stages of the practice of otolaryngology should finally best fit them to do environmental surgery. The line of cleavage suggested would be one which divides the specialty into a class wholly surgical and a class which is largely therapeutic and non-surgical. Non-surgical treatment

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of the nose, throat and ear will no doubt be necessary in the future as in the past, and such work would not only be well done, but better done by the laryngologist who is not surgically inclined, but who seeks to develop the best in a therapeutic sense, and whose efforts are no longer divided between therapeutic and surgical methods of cure. On the other hand those who have had ample surgical advantages and abundant clinical experience should in the interest of the patient and the conservation of their own energy, devote themselves wholly to the surgical side of the problem. This plan if carried out would serve the best interests of the patient in that he would on the one hand be saved from operations by those not best qualified to do them, while on the other he would gain by the greater experience and better judgment of the trained operator, and one whose surgical efforts are not daily burdened with a large office practice largely devoted to the local treatment of non-surgical cases.

Discussion.

Dr. D. Bryson Delavan, of New York City: The subject of this paper has been a most interesting one ever since the surgery of the larynx came into vogue. The statements of the paper bear out my own experience and that of all other laryngologists who have had to deal with operative laryngeal cases.

In the early days of laryngectomy the patient was apt to be placed in the hands of a surgeon who, proficient in general surgery, considered himself qualified to perform this highly specialized work, and that entirely upon his own responsibility and without taking advantage of the experience or the views of the specialist. Results were almost necessarily bad. It soon became apparent that success depended upon something more substantial in the way of special knowledge and experience than a reputation for general surgery. Time after time this was proved both here and in Europe. Such masters as Keen, Bull and Gerster who were willing to co-operate to some extent with the specialist and to make such a study of the subject as to place themselves above the ranks of ordinary surgery, soon proved the value of this wise course by the success of their work.

The association of Dr. J. Solis-Cohen with Dr. Keen in operations upon the larynx marked an era in laryngeal surgery.

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Later the appeal of the London specialists to Mr. Butlin opened the way for the perfecting of the technique of thyrotomy in the removal of recent malignant intra laryngeal disease. And in speaking of the operation of thyrotomy in general mention must be made of the work of one of our own number, Dr. Clinton Wagner, who in the late '70s and early '80s carried the procedure to a degree of technical perfection and clinical success which has never been surpassed. Also of a former member, Dr. Ephraim Cutter, who as Dr. Cohen has reminded us suggested the operation to him in the early '60s.

In our own experience patients operated upon by experts such as Bull and Farquhar Curtis have from the operative point of view done remarkably well, while those treated by general surgeons without special experience and ability have been disappointing. In two cases both particularly favorable from every point of view, and each operated upon by men of highest general surgical distinction, the patient upon regaining consciousness was left with a young nurse who had never even seen a case of simple tracheotomy. Within half an hour in one instance, and two hours in the other the tracheal cannula, which had been inserted, by the way, against the advise of Mr. Butlin and several other high authorities, was coughed out. The attendant not understanding how to replace it rushed for assistance only to find the patient asphyxiated upon her return. Inspiration pneumonia has also carried off its quota although the cases were in the hands of surgeons equal in eminence to the above. Indeed the experience of more than a quarter of a century has given ample reason for the misgivings of those who at that time were unable to give to laryngectomy their full confidence and support. Some surgeons are particularly fitted for certain types of special work while some laryngologists are by nature therapeutists and some are surgeons. It goes without saying that highly specialized operations should be done either by the specially trained surgeon or by the surgically born and bred specialist.

Dr. J. Solis-Cohen, of Philadelphia: One case occurred in my own practice which I have never published, and one very similar to that mentioned by Dr. Delavan. As all the people connected with it are now dead I will relate it. I performed a laryngectomy, leaving the wings of the thyroid cartilage, taking out simply the interior by a method which I devised at that time. I performed the operation and I had, as I thought, a good assistant at the hospital. I lived only three or four squares from the hospital, and at twelve o'clock that night it seemed to me I must go to the hospital and see what was the

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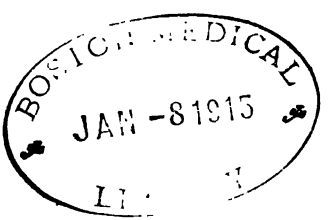
matter with that patient. I went, and found the main nurse asleep on the floor beside the patient; the resident physician had told me he would stay up with the patient all night himself and would let me know if I were needed. Then I went into that resident's room and found him in his bed asleep. And if I had not been at that moment by his side that patient would have suffocated from trouble with his tube.

Another case occurred somewhat like that, and I felt a desire to go to the hospital, and when I reached the bedside I found the man struggling with a trained nurse who was trying to put in the tube upside down, strangling the man before my very eyes. Ever since then I have stayed by my patient for twenty-four hours. There are more patients lost by the after treatment in laryngectomies than by the improper performance of the operation.

Dr. Henry L. Swain, New Haven: When we consider that Gluck, who was the pioneer in doing complete laryngectomy, has performed his last 61 operations without a single operative death, it proves that the general surgeon, when he learns how, can do the job pretty well. When you take a man who does a thyrotomy and scoops out the growth without rhyme or reason we understand why it is desirable for the laryngologist to be present, and at least direct. In other words, we who are interested and know the anatomy of the parts are better qualified to advise the general surgeon and to lend assistance when such operations are being performed on our patients. This is equally true in removal of the hypophysis. If the external surgeon wants to do the external surgery all right, but within the usual cavity, we could do the operation as well or better.

Dr. John F. Barnhill, Indianapolis (in closing): I agree with what has been said. I think it was not however understood that I feel, as do some others, that laryngologists and otologists should do all neck and head surgery. How often it is that we remove a tonsil and we find that the child or adult has a number of diseased cervical lymphatic glands that must come out; it seems that we should be able to undertake this work and not have to call some one else to do it. I believe the patient would stand a better chance of good recovery in this and other environmental surgery, that we would have a better interest, and that by proper and sufficient training we should be prepared for this work even better than is the general surgeon of to-day.



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LIMITATIONS OF BRONCHOSCOPY.

BY CHEVALIER JACKSON, M.D.

After a monotonously long series of successful cases the bronchoscopist is apt to think there are no limits to bronchoscopic foreign body removals. Sooner or later, however, he will discover that there are very decided limitations. These limitations, so far as present experience shows, are all the failure to find a small body that has entered a minute bronchus far down and far out toward the periphery. In such cases, if the localization methods of the film, Boyce calipers, fluoroscopy, etc., have failed, the question arises whether it is advisable to incur the risk of endoscopic excision, with the aid of two fluoroscopists, one for the lateral and another for the vertical plane. Naturally the risk of such a procedure will depend upon the nature of the tissue intervening between the foreign body and the end of the bronchoscope, and this, in turn, will depend upon the location of the intruder. With foreign bodies in the larger bronchi near the root of the lung it is not to be thought of, but here endoscopy is rarely, if ever, unsuccessful. At the extreme periphery the danger is less, and is largely concerned with the contingency of opening a vessel that will permit blood to be retained to break down later as well as with the immediate risk of hemorrhage. The author has planned such an operation but has not yet encountered an endoscopically unsuccessful case of foreign body so located as seemed to involve less hazard than thoracotomy. Theoretically it might be supposed that the shortening of the bronchi that takes place in pneumothorax might be sufficient to cause the point of a pin to emerge from the invaded bronchus into the larger one of which it is a branch. In one case observed by the author (Della J.) this did not occur. The question arises, what shall be done in the event of the bronchoscopist having failed to find the foreign body, having used all the methods of localization mentioned. The writer feels that duty to a fellow creature

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demands that at least one other skilful bronchoscopist should try before deciding upon either leaving the foreign body alone to nature, or sending the patient to the general surgeon for thoracotomy. Up to the present writing the author has had five failures and he congratulates himself upon his not having advised either of these alternatives without the patient having the benefit of the efforts of another bronchoscopist. In his first failure, Prof. Killian had previously failed, and the author had with him at the time of his own attempt Algernon Coolidge, Jr., who made a careful search, at the author's request, after the author's failure to find the foreign body. In the second case, Cornelius Coakley had previously attempted to find the foreign body. In the third case, Samuel Iglauer and J. W. Murphy had both attempted to find the foreign body, and in the fourth case Dr. P. M. Hickey had attempted to find the foreign body. In the additional case the patient was taken away from the hospital by the father, who positively refused to leave it until another bronchoscopist could be called. In the four cases enumerated, after the efforts of the expert bronchoscopists mentioned had failed to find the foreign body, the author felt that with his own feeble efforts failing also, that the limitations of bronchoscopy had been reached, and that it remained to consider the next step.

In deciding this question, it is first necessary to consider what will happen if the foreign body is allowed to remain. This has been gone over analytically by Roe, Wood and others in the pre-bronchoscopic days, and by Claytor, Clark and Marine more recently. Because of its brilliant achievements bronchoscopy has been universally accepted, and for that reason, in latter days, but very few foreign bodies have remained in the bronchi when their presence was known. The cases where bronchoscopy has failed have been limited to cases in which the foreign body could not be found, and these have invariably been very small bodies far down and far out at the periphery. In this location the most probable result is that an abscess will form and that it will burst through into the pleural cavity. It then becomes a question whether thoracotomy shall be done at once upon the failure of bronchoscopy, or whether the abscess

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formation with invasion of the pleura shall be awaited. The chief arguments against waiting are that the patient may not survive sufficiently long for the development of the abscess and the reaching of the pleura. Furthermore, the foreign body may not follow the abscess into the pleural cavity, as seen in the case of Mrs. K., reported in a previous chapter. In that instance the foreign body was easily removed through the mouth, because it was large and consequently easy to find. Because of its large size, also, it had not reached the point near the periphery after the original accident, and it toook twenty-six years for the abscess to reach the pleura. During the wait for an abscess to reach the pleural cavity, there is, of course, the possibility that the foreign body may slough loose and be coughed out. Such a possibility is remote in any case, and in case of some bodies, as pins, it is impossible. Furthermore, as pointed out by Delavan, lesions may be established which will result in the death of the patient even after the foreign body has been gotten rid of. Apropos of this, a very interesting collection of thirty-two cases is reported by Carke and Marine, in which gangrene of the lung followed the aspiration of a foreign body. Their analysis is as follows: "Of thirty-one cases the foreign body was a tooth twice, a pin once, a piece of wood once, a button twice, a head of grain or grass seven times, a bit of evergreen twice, a fruit stone twice, a bone ten times; not mentioned four times; that is occurred with equal frequency in adults and children; that it remained in the bronchus before gangrene set in from four days to five months, usually under three weeks. The gangrenous process lasted from three days to four years, most frequently from two to four weeks; the outcome was death in twenty-one cases, recovery after thoracotomy in two, and spontaneous recovery in four cases. The foreign body was coughed up in five cases, four of which subsequently died and only one recovered."

To these statistics is to be added the case that Clarke and Marine themselves observed, in which a man died of pulmonary gangrene seventeen days after aspirating a fragment of bone, death occurring two days after the first appearance of putrid expectoration. Viewing the question impartially from

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all sides, the author believes first that large foreign bodies, which necessarily stop in the trachea or large bronchi, can always be removed by bronchoscopy; therefore, thoracotomy is absolutely out of consideration. In case of small foreign bodies far down and far out at the periphery, after two expert bronchoscopists have failed to find the foreign body, the intruder should be removed by external operation, and the sooner after the bronchoscopic failure the better, because of the usually early development of septic processes around an aspirated foreign body. Modern developments, and especially the intratracheal insufflation anesthesia, originated by Meltzer and Auer, and developed by Elsberg, Janeway and others, has placed thoracotomy on a plane never before obtained, and while the pleural shock remains, the mortality is very much decreased and the operation has reached the stage where it is justly entitled to consideration in cases where two expert bronchoscopists have failed. It is certainly preferable to taking the chances of leaving the foreign body alone. Formerly there was great difficulty in finding the foreign body after the lung was open, but in the modern operation with the very large flap and ample opening, where the entire lung can be handled, the chances of not being able to find the foreign body are very small. In the event of a foreign body reaching the pleura, either with or without pus, it should be immediately removed by pleuroscopy, or by thoracotomy, without waiting for adhesive pleuritis.

As to the details of thoracotomy the author has never done the operation and never will. He begs, however, to make two suggestions. First, in these days of insufflation intratracheal anesthesia, the bronchoscopist is of no use in the operation. Any aid in localization he may be able to afford is better given verbally by naming the approximate location of the invaded bronchus. Second, the best method of visceral localization is by the author's transparent films, because after collapse of the lung the relations of the visceral to the bony anatomy is entirely changed. Third, the best method of location of the osteoplastic flap is by the method of Lewis Gregory Cole and other expert radiographers. Fourth, as the infective risk is slight, and the operative risk is greater than the square of the

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duration, the operation, especially in children, should be done without gloves. However trained the gloved touch no one can argue that a pin cannot be found quicker in the lung without gloves than with them, especially in the case of infants and children, where the largest possible opening will not permit the use of the whole hand. Extraordinary care in preparation of the hands will make the hands reasonably safe from infective risk in this, the only operation in surgery where gloves may kill the patient.

The Author's Unsuccessful Cases.

Of the author's five unsuccessful cases one was before the development of bronchoscopy to a reasonable degree of efficiency, and moreover, he alone had tried removal in that case. Four cases have occurred since. All five were failures to find a small foreign body in a minute bronchus far down and far out toward the periphery. The author hopes that his elsewhere mentioned recently perfected means of localization will in the future be of assistance in lessening the number of unfindable foreign bodies, though these methods were used in the last case of the four and failed to enable success. In each of the four cases to be considered here removal had been previously attempted by skillful bronchoscopists of large experience. Had the author alone failed on these four cases he would feel that they were personal failures. But with the failure of two or more bronchoscopists they should be considered as failures of bronchoscopy and should be analyzed as such, in order that bronchoscopy, like any other department of medical science, shall profit by its failure.

Miss C., aged eighteen years, referred by Dr. Edward S. Bacon. Patient had aspirated a pin four weeks previously. No cough, expectoration or other symptoms. Dr. Bacon saw the pin endoscopically in the right bronchus immediately after the accident, but was unable to disimpact it with all the traction he deemed safe. A few weeks later the pin was, radiographically, found to have gradualy worked its way toward the periphery of the lung. Prof. Killian, who was the guest

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of the American Laryngological Association at the time, made an unsuccessful bronchoscopic attempt at removal. A few weeks later the author passed a bronchoscope. Ether was used at the start, but was discontinued after about fifteen minutes. He had the honor to have with him Algernon Coolidge, Jr., one of the pioneer bronchoscopists. Neither of us could find the pin, which was plainly evident in the radiograph. We found the bronchi of the left lung all normal in appearance. The mucosa of all the right bronchi was congested and swollen. The orifices of the branch bronchi were diminished to about half the normal size, as estimated by comparison with the opposite side. As Dr. Coolidge pointed out, there were no localizing signs, such as emerging pus to lead one to suspect one bronchus more than another. A few were carefully explored by the author with negative results. The search occupied about an hour and a half. There was no reaction and the patient left the hospital. Her health was fair at the end of a year. Occasional "jagging" pains were felt, and there was some cough. At the last report the pin was gradually working toward the pleura.

Mrs. S., aged 43 years. Seen in consultation with Dr. Cornelius Coakley, at St. Luke's Hospital, New York City. Patient had a strumic stenosis for which a tracheotomy had been done by Dr. Farquar Curtis. A pin had been aspirated into the bronchus two months before admission, and excellent radiographic work of the hospital radiographer had located the posteriority very low in the left lung. Dr. Coakley had made a careful and skilful search without finding the pin. The author was equally unsuccessful. There were no localizing signs. In one of the bronchi the author thought he felt contact of the pin, but it could not be sufficiently confirmed to justify using the forceps. The patient died one and one-half years later after refusing external operation for pulmonary abscess.

Remarks: In passing, it may be said that the extreme posterior location of the pin and the presence of a tracheotomic wound (made for strumic stenosis, led the author thoroughly to test out the supposed advantages of tracheotomic, or

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"lower" bronchoscopy. He could discover no advantage whatever as compared to oral bronschoscopy with the head in the Boyce position. This was in 1908, and the author has not done a tracheotomic bronchoscopy for a foreign body since.

Miss J., aged nineteen years, referred by Dr. Samuel Iglauer, for a pin in a posterior branch of the left inferior lobe bronchus, as shown in an excellent radiograph by Dr. Lange, of Cincinnati. Drs. Iglauer, Mithoefer and J. W. Murphy, all endoscopists of large experience, had failed to find the pin bronchoscopically. The author made two bronchoscopic searches, one with ether and one without. He could not find the pin nor any pathologic signs of its presence. Twenty-four hours later pneumothorax was evident. The pin was displaced and tilted. Another search was made, but it was also unsuccessful. Dr. J. Hartley Anderson removed the pin by thoracotomy, making a large osteoplastic flap posteriorly. The patient made a good recovery and in a few weeks the lung had expanded.

Carol H., aged sixteen months, referred to the author by Dr. P. M. Hickey, for a pin in a dorsal branch of the left inferior lobe bronchus. Two bronchoscopies by Dr. Hickey had failed to find the pin and the author was equally unsuccessful. A general surgeon of large experience, by a quick and skillful thoracotomy removed the pin. The patient succumbed twenty-four hours later.

Discussion.

Dr. Cornelius G. Coakley, New York City: With regard to the case of 1908, referred to, this woman had held a pin in her mouth; it was one with a white bead head and was about an inch long. She also had a very large goitre, which had compressed and dislocated the trachea so that it was practically impossible to pass a bronchoscope through the larynx down the trachea beyond the constriction. We could not use force enough to pass it below the compressed area of the trachea as far down as the bifurcation. A tracheotomy was done and then a subsequent attempt was made to get the pin; the pin was seized in the forceps but the patient coughed and

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I lost the pin, which went down further with the point up, and although I was able to see it I was later unable to get it. Dr. Jackson did not even see the pin. I think there is no question that had the modern methods of lung surgery with intracheal anesthesia been then developed it would have been a perfectly safe and probably successful procedure to remove this pin by external surgery. This attempt took place in about the first three weeks of the involvement. Dr. Jackson, in his modesty, did not tell you of another case. Dr. Jackson very kindly came to Rochester about two years ago to see my sister-in-law, who had inhaled a piece of orange peel through the larynx into the trachea and right bronchus, and developed soon after a very severe irritating cough and bronchitis, forgetting all about the original cause until about two weeks after the accident when the physician discovered this localized bronchitis and could not understand why it was localized until he got this history. Moreover, the fact that on two or three previous occasions some similar foreign body had been taken in during the process of mastication, coughing and inhaling, and each foreign body had been expelled within a few hours or two or three days after the accident. A radiograph showed considerable involvement of that side of the lung, but air could get in. After a physical examination Dr. Jackson decided, although there was nothing showing in the radiograph, not to do a bronchoscopy. The patient developed an abscess; either a bronchiectatic abscess or abscess of the lung, and discharged pus in great quantities, and lost fifty or more pounds in weight during the next six months. The sputum showed no evidence of tuberculosis. She made a good recovery after a year of suppurating process in the lung about this bit of white skin from inside the peel of the orange. If Dr. Jackson had done a bronchoscopy with his skill in all probability he would have found that piece of orange skin and removed it, and saved the patient the dangerous, but fortunately not fatal, abscess.

Dr. Thomas Hubbard, Toledo: With regard to the limitation of bronchoscopy. This may, in a way, be established by the patient. Nothing is so exasperating as to attempt this difficult work without the patient's support and also that of his physician. Dr. Jackson will corroborate me in saying that secondary operations are the very difficult ones. The valor of the patient sometimes vanishes in this ordeal. On the other hand, occassionally the loyalty and assistance of the patient is a big factor in success. I recall the case of a woman who had a fragment of dental cement in the lower right bronchus, and one of these radiograms reminds me of it. It was located

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about the ninth rib posteriorly. There were seven months of ulceration, abscess formation, and all the symptoms of tuberculosis. This woman's intuitive conviction that she had a foreign body there forced the diagnosis and saved her life. Although fluoroscopic study showed nothing she insisted there was something in her lung and finally, seven months later, a competent Roentgenologist located it. My first attempt at removal was a failure; the abscess cavity was full of pus and debris, and I could not see the foreign body. Following the operation when I told her that I had failed, she said calmly, "Never mind, you will get it the next time." The second attempt was mode with a stereoscopic picture to guide, and I successfuly removed the foreign body. That kind of courage inspires one and enhances the possibilities of bronchoscopy. Dr. Jackson's rules, with reference to the prolongation of the operation and repetition, are undebatable, and his paper will aid in preventing abuses which naturally creep into every new procedure.

Dr. Emil Mayer, New York City: I recall being asked to see a boy in the Presbyterian Hospital in New York who had a tack in his right bronchus which had been there for more than a year. It was quite easy to do the bronchoscopy, but I simply could not see any sign of this tack. The bleeding was profuse, and I could not see any evidence of the foreign body, and I felt that here was one of the important rules to live by, "Be sure you are right and go ahead." It is possible if then I had known as much about using the powerful magnet as Dr. Iglauer has recently shown us I might have been more successful.

Another instance, showing the difficulties of bronchoscopy, I was called recently to see a young infant of about thirteen months, who had inhaled an open safety-pin. A picture showed the pin in the upper portion of the larynx, and the local physician thought he could get it out by doing a tracheotomy. He failed. A second picture showed the pin had slipped down the bronchus. It was not a difficult thing to introduce the bronchoscopic tube through the opening the physician had made, but the baby's condition was poor, and I could not find the pin; the child's condition becoming worse I desisted, and a few hours later the child died.

Dr. D. Bryson Delavan, New York City: While it is interesting to understand the limitations of bronchoscopy it is also valuable to realize what splendid work it has done for humanity and in doing so to appreciate the influence of this country in the development of the art. More than seventy years ago

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Dr. Horace Green, of New York, established the physiological law of the tolerance of the larynx to the presence of a foreign body. Acting upon this principle Dr. O'Dwyer, of New York, invented a practical method for the intubation of the larynx and he devised a tube of large calibre for the special object of facilitating the expulsion of foreign bodies from the bronchi and trachea. In conversation with him it became evident that this special tube represented the beginning of a series of experiments which he had in mind, and which, had his life not shortly afterward been terminated, would have placed the art of bronchoscopy far in advance of where he had left it. Later the work was taken up by Dr. Algernon Coolidge, of Boston, who lengthened the O'Dwyer tube and proceeded to illuminate the trachea through it by means of reflected light. Mosher of Boston still further advanced the method. Meanwhile Edison had invented the incandescent lamp and this lamp has been adapted to the uses of endoscopy in general. Up to this point the advance had been absolutely and entirely American. It only remained for Kirstein to improve the methods for the introduction of the tube and for the principle of the endoscope to be applied to the illumination of the trachea. These things having been successfully advanced by Killian were finally perfected by Chevalier Jackson. It is interesting to note that in the excellent instrument of Bruning, the lamp is not inserted into the trachea, but is placed outside and near the entrance of the tube, the inventor thus reverting to the principle of the method of Coolidge.

In view of these plain facts it seems right that we should claim our just share in this invention, which has been the means of saving so many valuable lives. While in former days patients sometimes survived the inhalation of foreign bodies, in the majority of cases the result was fatal.

Dr. E. Fletcher Ingals, Chicago: I am very glad that Dr. Jackson has brought up this subject, and I hope he will, in closing, say something about the limitations as to time. Dr. Hubbard spoke of some one working for four hours, and this impresses upon me the necessity of having a final word on the time one may work on such a case. For my own part I have felt that we ought not to work more than half an hour. When one feels the next second he will be successful he hates to quit; also when there is a good deal of secretion he dislikes to stop before trying just once more. In some of the long-drawn-out operations about nine-tenths of the time is occupied in swabbing, and one-tenth in looking for the foreign body. If we say no case should be operated on for longer than one hour

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we would not be far wrong; while half an hour should be the limit in the majority of cases.

I have had my failures in getting out foreign bodies and I have sweat blood over them. I have recently, as you know, written a short article on fluoroscopic bronchoscopy. I think this is going to be a great aid in certain cases, especially those where there has occurred constriction above the foreign body in those where the foreign body is in a small bronchus, into which the light cannot penetrate; in those where the secretion is excessive, and in those where a large irregular purulent cavity contains the foreign body. One of the first cases I had was that of a young man who had inhaled a collar button, which had gone down into the left lung. I could not see its shadow in the skiagraph. It was, I think, of vegetable-ivory or bone. In doing a bronchoscopy I found a granuloma at the opening of the left main bronchus, which practically occluded the lumen. I removed this and the patient then expectorated several ounces of offensive pus, but I did not get the foreign body. I think that I tried again in a few days, but at any rate he got so much better that a piece of cotton which had slipped out of my cotton carrier and which I had removed, I afterward believed must have been the button, for he was very well for two or three years. His trouble recurred, and he returned to Chicago and at that time the radiograph showed the shadow of the button, and I made another effort to get it. I could see what appeared to be scar tissue drawn tightly over the button, but I could not find the button. Later I did a thoracotomy as he had an abscess in the lung, but did not get the button. Several days afterward he nearly bled to death, but the bleeding was stopped and he got very well again. He went back to his home, but finally returned to the hospital and died when I was not in the city. The post-mortem showed the button free in a bronchus.

I had a failure two or three years ago that was extremely interesting. There was a pin, which appeared to be about two inches long, with a small glass head, away down in the right lung with the head downward; it had evidently gone into a very fine bronchus. I did upper bronchoscopy twice and then I opened the trachea and did a low bronchoscopy, but it was impossible to get any light into the bronchus in which the pin was lodged because I could not get the tube near it, owing to its small calibre. The woman went home and the wound in the trachea healed. I have not seen her since the last trial, but have had reports from her physician that several radiographs have been taken since, and the pin has disap-

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peared. I cannot understand how it could disappear, because of the glass head, unless the pin became loosened from the head and worked through the tissues and the glass head was coughed out.

I had another failure, with a nail in the upper lobe of the left lung. A surgeon had already done a tracheotomy and tried to get this out, and the boy had a severe pneumonia at the time. This is a very difficult position in which to see a foreign body. I could not see the nail, although I hunted carefully, and had to give it up; the boy died of pneumonia a day or two later.

I had a little chap who had a nail in an abscess cavity in the lower part of the right lung, from which great quantities of pus were being expectorated. The shadow showed perfectly but it was impossible to throw any light into the cavity. It was so far down I could not get a bronchoscope near it. Finally I tried a fluoroscopic bronchoscopy. I could pass the forceps down so that I could see the shadow of the forceps touching the shadow of the nail. I tried to grasp the nail, but on making traction the shadow of the nail would come up an inch or so and then the forceps would slip. I do not think I had hold of the nail at all. The boy died of pneumonia.

I later had a child with a nail in a small bronchus far down in the left side, so far that I could not see it. I tried bronchoscopy a couple of times, but could not find it. I then tried fluoroscopic bronchoscopy. From the shadow I could catch the head of the nail with my forceps but it slipped off every time. I then had a forceps made with the blades like a sharp file, the cutting edge up. At the next operation I caught the head of that nail right away and removed it. This forceps has never slipped. I learned something in this case. As I passed the forceps down its shadow disappeared in that of the nail, but instead of trying to catch the nail at once I moved the forceps back and forth laterally, and discovered that it was not in the same bronchus. Later I got it into the proper bronchus and as the shadow of the forcep moved that of the nail went with it. I then seized the head without difficulty.

I recently had a man who two years previously had aspirated the gold band of the crown of a tooth into the upper bronchus of the right lung. There was stenosis resulting from ulceration of the bronchus, and a large cavity had developed in the lung, which would empty itself every few months. Because of the constriction I could not see into the bronchus, although I could see the scar and a little secretion escaping. I used fluoroscopic bronchoscopy. I first passed the bronchoscope

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down to the scar and the forceps through it then using the fluoroscope. I could see the direction to the foreign body. I then pressed the forceps gently through the stricture, and when its shadow reached that of the gold I opened the blades, pressed them on half an inch farther, caught the foreign body and pulled it out. It came through a very tight stricture, and as it snapped out I thought I had lost it; but when it came against the end of the bronochoscope I found I had gotten it after all.

It so happened that a week later I helped Dr. Friedberg with a child with a small screw in the left bronchus where we could not see it. We removed this in the same way.

In similar cases where we cannot expose a foreign body that will throw a shadow I think fluoroscopic bronchoscopy will aid us greatly. Dr. Friedberg wrote to Dr. Jackson about this case, and I think the latter's criticism was quite right. He feared that many physicians would try this method relying wholly on the shadow, and that they might kill many patients. Those who pass the forceps and grasp at the first shadow they see are likely to do a great deal of harm. When we are sure that our forceps are in the right tube, we may be able to get foreign bodies not removable in any other way. With foreign bodies which do not throw a shadow this method is not available. When there is an abscess with much pus it is often impossible by simple bronchscopy to find the foreign body; when a stricture has occurred it is liable to be impossible; and the same is true when the body is in a fine bronchial tube. Fortunately, some organic substances will be coughed out, but I think that 90 per cent to 95 per cent of the patients with foreign bodies in the lungs will die within three or four years, unless the foreign body is removed.

Dr. William E. Casselberry, Chicago: A foreign body, smooth and loosely lodged in the bronchial tubes, is liable to be displaced upward by the lowering of the head or by cough incidental to the anesthesia, and then be hidden beneath the ledge of the vocal cords where there is more space for concealment than one might suppose. This was illustrated in my practice by a large grain of raw corn first lodged in the right bronchus of a small child. Though but three and one-half years of age, it seemed that upper bronchoscopy might be tried, while holding in reserve tracheotomy and lower bronchoscopy. The latter, I now believe, would have been less hazardous in so small a child, but no more assured of success in this particular condition unless one had it in mind to explore the upper as well as the lower limits of the bronchoscopic field.

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Two different skiagrams had shown a poorly defined spot in a position approximating the right bronchus, which harmonized with deficiency of respiratory sounds over the right lung. I searched diligently in the narrow field afforded by the smallest bronchoscopic tube passed after some difficulty from the larynx into the main bronchus but found no grain of corn. Things were beginning to look very uncertain when on withdrawal of the tube gradually and cautiously, just as the tube slipped out of the top of the larynx the grain of corn popped into view from beneath one vocal cord. In that position of the patient, with the head down, it had left its place in the bronchus and slipped upward on passing the tube again into, but not through the larynx, certain deep inspirations afforded momentary glimpses of the corn, and by lateral pressure it was grasped in the smooth fenestrated jaws of a Bruning forceps, and despite resistance by ensuing spasm of the glottis with arrest of breathing it was successfully withdrawn.

Dr. Harris P. Mosher, Boston: I should like to speak of a case which I recently saw in connection with Dr. Coolidge. I mention it because one of Dr. Jackson's cases parallels it somewhat. Dr. Jackson stated that after an unsuccessful examination for a foreign body the patient may suffer from the formation of an embolus. The patient to whom I refer came out of ether after the removal of a chicken bone with a right hemiplegia. The question at once arose as to what caused it. The man took ether poorly. He was well along in years (had a thick neck), and during the examination became very cyanotic. The final opinion of the consultants was that the condition was probably a straight hemiplegia due to the hard examination. It was agreed, however, that an embolus could not be absolutely ruled out.

Dr. Chevalier Jackson, Pittsburgh (in closing): In regard to Dr. Mosher's statement as to the limits the point I wished to make is that the limitations of the method are shown when two men have tried and failed, for then I think we can say that failure is due to the limitations of the method rather than to personal limitations.

In my case of cerebral embolus the embolic accident occurred four weeks after a foreign body was removed with no special difficulty. Either from a septic endocarditis or from the lung itself an embolus had gotten into the cerebral circulation, and it was in no way connected with the bronchoscopy. His physician, Dr. Moorehead, of Brooklyn, reported the boy improved for almost a month, and gainly rapidly, when suddenly he had a convulsion, followed by paralytic symptoms. It is

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too much to expect invariable ultimate recovery after extensive pulmonary and endocardial changes are established.

Dr. Swain raises a number of interesting questions in regard to anesthesia. I have seen no reason to change my personal opinion as given in a paper before this association two years ago. No anesthesia, general or local, is needed in children under six years of age.

In regard to suspension laryngoscopy for foreign bodies, I have not tried it, and therefore am not qualified to speak. I have no doubt it has a large field of usefulness.

The limitations in regard to duration of bronchoscopy in unsuccessful cases were asked for by Dr. Ingals. Each operator must decide for himself. The limitations stated by Dr. Ingals seem to me about right. If every man would publish the duration of bronchoscopy in every case we would soon arrive at definite conclusions. Half an hour for a child and an hour for an adult might be taken tentatively for a standard, to be modified in the particular case. My longest case in an adult was three and a half hours, but this patient had no anesthetic; he was a Marathon racer, an atlete used to enduring physical stress, and he insisted on my continuing until I succeeded.

Dr. Ingals brought up the question of limitations in upper lobe bronchoscopy, to which I am glad he called attention. The limitations I reported were in cases of a foreign body, far down and far out, at the periphery in a minute posterior branch too small for bronchoscopy. All were failures to find, not to remove foreign bodies after finding them.

Dr. Delavan referred to Horace Green's work; this is interesting and entirely new to me.

Dr. Mayer and our President bring up interesting and well taken points too numerous and extensive for this discussion. In regard to Dr. Coakley's case where I decided not to do the bronchoscopy that was probably an error of judgment on my part, and is not to be taken into consideration in this discussion, because if we include the errors of judgment there is no limitation to what bronchoscopists, such as myself, may do.

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THE EMPLOYMENT OF SKIAGRAPHY IN THE DIAGNOSIS OF ENLARGEMENT OF THE THYMUS GLAND.

BY D. BRYSON DELAVAN, M.D.

Enlargement of the thymus gland, whether associated with the conditions known as "Status lymphaticus" or otherwise, can no longer be called a pathological curiosity. Cases occur with sufficient frequency to have brought the subject prominently forward, and a considerable literature upon it has, during the past ten years, been developed. Indeed, there are few large clinics in which accidents due to this cause have not occurred to patients under operation. Diagnosis by ordinary means is often difficult, and the only intimation of trouble comes too late. Another difficulty lies in the infrequency with which illustrative cases present themselves. The average clinical attendant may never have seen one until he finds himself confronted with the fatal occasion. Recently the skiagraph has been called into requisition, with results both valuable and interesting, as shown by the following cases.

Case I. R. S., aged seven, of American parentage, a slender, anaemic looking boy, with weak heart, contracted chest, and history of frequent attacks of illness. Both tonsils were enlarged and the upper pharynx was filled with a large mass of hypertrophied lymphoid tissue. His physician in Philadelphia had made the diagnosis of probable enlargement of the thymus gland. The symptoms due to the naso-pharyngeal condition, however, were so urgent that we advised operation. The case was seen in consultation by Dr. Herbert Carter and Dr. Norton, of New York, who failed to demonstrate the presence of thymus enlargement. In view of this difference of opinion a skiagraph was taken by Dr. Cauldwell, of New York. The picture showed the thymus to be absolutely normal. The patient was operated upon, Dr. Thos. L. Bennett administering ether. Nothing unusual happened, recovery was rapid and satisfactory, and up to the present time the child's condition has been all that could be desired.

Case II. I am allowed to report this case through the kind-

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ness of Dr. John E. MacKenty, of New York. A child two years old was brought to his clinic to be operated upon for hare-lip. His skin was rosy but white, and his hair was scanty, the muscles of his neck were thick, his hips were large, and the body in general was too fat. The operation under general anaesthesia lasted one-half hour. Six hours after operation the patient suddenly died. A skiagraph was immediately taken and an autopsy made.

The plate demonstrated the presence of a thymus which extended below the level of the ensiform cartilage. The autopsy showed an immense hypertrophy of the thymus, thus confirming the remarkably clear finding of the skiagraph.

I have presented these two cases because they seem to typify to a remarkable degree the value of the X-ray in deciding questionable conditions of the thymus gland. It would have been easy to secure an indefinite number of plates representing the same thing. The multiplication of examples, however, would add little to the weight of the argument already so fully sustained by these. Without doubt, the use of the X-ray before operation would result in the saving of lives. The examination of every child, therefore, would seem desirable.

But, it will be said, the examination of all the children in attendance at a large clinic with our present facilities in the X-ray department, would be impracticable, even if the fluoroscope could be depended upon to do the work. Unfortunately, at the present time, the use of the fluoroscope seems out of the question, for there are several reasons which make it impracticable. A fluoroscopic examination would require at least twenty minutes of time, ten minutes being consumed in accommodating the eye to the dark room. Again, the struggles of the average child would make the procedure extremely difficult. Finally, even under favorable conditions, recognition of the conditions present in the examinations on this part of the body with the fluoroscope in the infant is often impracticable.

In view of this, dependence must be placed not upon fluoroscopy, but upon the skiagraph. A good skiagraph, skilfully taken and well interpreted, will give far the best information. Here again we are confronted with difficulties. The ideal conditions would obtain, of course, in private practice, where ex-

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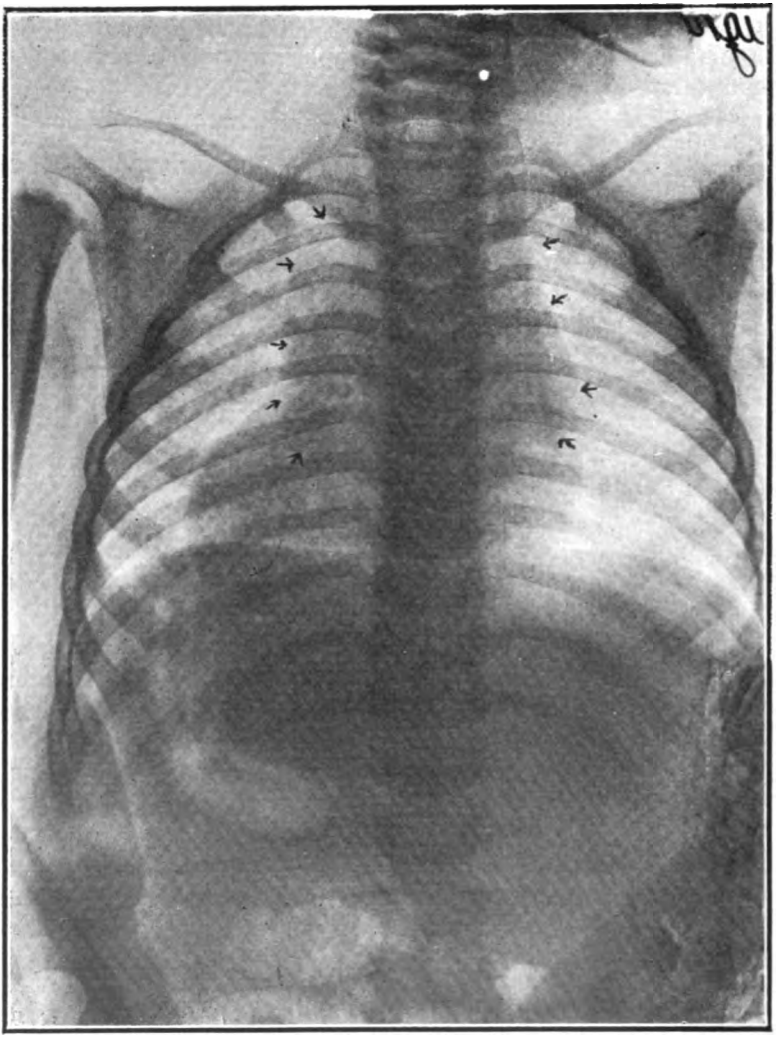
pense might not be an obstacle and where the services of a good X-ray specialist would be at command. Even here the way is not always clear, even in the matter of expense. Take,



for example, the case of a patient operated upon in the private department of an expensive hospital, add the fees for consulta-

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tion with a distinguished authority for examination of the blood and the urine, for the skiagraph and for various other possible extras, and it is no wonder that the account of the surgeon, modest though it may be, seems a final blow even to a generous purse.

In clinical practice the making of skiagraphs at the rate of say twelve a day would require the equipment and services of a full department, as such matters are now organized and conducted in our best hospitals. Take, for example, the X-ray department of St. Luke's Hospital, New York, one of the most complete in the country. Under its present conditions it is fully capable of executing the work of a large general hospital. For it to meet the demands of an out-patient clinic of even moderate size would require the practical reduplication of the staff and plant, of course at great expense. Granting the value of skiagraphy, how, then, can it be made a practical resource in this connection? As a matter of fact few clinics are connected with institutions supporting an X-ray department, and as we have already seen, such a department adequate to the other needs of the institution would be overwhelmed by the flood of work thrown upon it by the throat clinics.

The answer to this would seem to be, first, in the possibility of so reducing the expense of skiagraphy as to bring the use of it within more reasonable financial limits. Next, to simplify the process, especially to the end that less time be consumed in the execution of the work. Finally, to impress upon the minds of the managers of hospitals the value of skiagraphy in this class of cases, and urge that as far as possible proper provision be made for attending to them.

Again, since to examine all would be impracticable, to urge that in any *suspected* cases for operation an X-ray examination be made before operation is attempted.

In conclusion, careful instruction should be given to clinical attendants, to the end that they be warned as to the dangers of operating upon patients having enlarged thymus gland, and that they be made competent to diagnose such cases when they present themselves. It is highly desirable, therefore, that

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the attention of assistants be directed to the subject, and that they be urged to inform themselves thoroughly upon it.

Discussion.

Dr. Cornelius G. Coakley, New York City: I recently had an experience with thymus disease in an adult. A man was sent to me for an opinion as to what should be done for what seemed from the history before seeing him to be goitre. The man had an enormous neck; instead of his usual fifteen collar he was then wearing a nineteen and a half. There was entire obliteration of the angle of the jaw owing to the swelling. There was slight exophthalmos. The pulse rate was 130 when quiet, and feeling that in all probability it was a case of exophthalmic goitre I referred him to Dr. John Rogers. Radiography showed a tumor behind the sternum, a good sized mass with every suspicion that it was an enlarged thymus instead of a thyroid. After observing him for a week or ten days Dr. Rogers thought the enlargement which varied from time to time was due to some lymphatic obstruction connected with the thymus gland, and suggested that he make an exploratory incision of the thymus behind the sternum and if feasible to extirpate the mass, while if a malignant process were found to leave it alone. He made his incision in the skin and found that instead of small peripheral veins the superficial veins were as big as his little finger. Dr. Rogers was able to palpate the mass with his finger and found an enlarged thymus gland, but thoroughly and extensively bound down to all the tissues in the thorax with no possibility of removal without killing the patient. The incision was sewn up and he lived for only a few months. It is the only case of unquestioned malignant disease of the thymus in an adult that I have ever seen, and it was diagnosed very satisfactorily by radiography.

Dr. John F. Barnhill, Indianapolis: This radiograph looks very much like a number of radiographs I have seen of the thyroid of the substernal variety, and of course that would hardly be the case in a child so young, but it might have been the case with Dr. Coakley's patient. It must be very trying in such a case to be sure of the diagnosis; Dr. Wilson, of the Mayo clinic, has a large number of cases which closely resemble the one reported by Dr. Coakley.

Dr. Burt R. Shurly, Detroit: This question of enlarged thymus is exceedingly interesting. Capeille reported in a large series of cases 79% in exophthalmic cases an attending enlargement of the thymus gland, so that they afford us practical

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interest when we know that tonsils and adenoids are quite frequently associated with these attending conditions of hypertrophy of the thyroid and thymus, and it is particularly interesting from the standpoint of the inter-relationship which the tonsils and adenoids and thyroid have to each other. The enormous percentage is what I want to call attention to in a large autopsy report, showing that we undoubtedly operate on thousands of cases of enlarged thymus without knowing it, and it is only the very unusual case that dies suddenly that comes under our immediate observation. I happened to see a post-mortem at the Massachusetts General Hospital that showed what an alarming condition can be present in the way of an enlarged thymus without any knowledge about it. There are but few diagnostic methods from the physical signs to make one even suspect it. This case had all the clinical symptoms of status lymphaticus and the boy had died from an incised wound of the knee under ether with just a few stitches necessary. This brings vividly to mind what great danger we are constantly under in operating on adenoids and tonsils without knowing our danger.

Dr. Thomas Hubbard, Toledo: Thymic asthma is a condition similar to status lymphaticus, and pediatrists are working along a line similar to that suggested by Dr. Delavan—treatment by the X-ray; this is effective. Two cases have come under my notice. One child was sent to Dr. Leslie for an adenoid operation, a child under one year of age. The difficulty in breathing impressed the physician as peculiar, and he called in a pediatrist, Dr. Morgan, who diagnosed thymic asthma and an X-ray showed a merging of the thymus and heart shadows. Following the line of treatment which is now undertaken—the X-ray—after seven treatments there was produced almost immediate and permanent shrinking of the gland.

Another case of similar type is one in which Dr. Morgan was able to produce almost magical shrinkage of the thymus in a patient of about the same age. Both children seemed to have but a short time to live. They were cases *in extremis*, and the interesting feature is that the X-ray is not only a diagnostic factor but also a positive therapeutic remedy. These children we see occasionally, owing to the obstructive type of respiration, but with modern methods of diagnosis there is little excuse for mistake. As Dr. Delavan says—the radiograph of the thorax is a safety diagnostic measure in all cases of dyspnoea with or without lymphadenoid hypertrophies—and especially where operation is under consideration.

Dr. Henry L. Swain, New Haven: I have twice had a case

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of thymic asthma, confirmed the diagnosis by X-ray pictures, and then have secured marked benefit, practically a cure by the simple use of adrenalin ointment. The two glands, the suprarenal and the thymus, are somewhat antagonistic in action. Rubbing adrenalin ointment in over the projecting apex of the gland three or four times a day, we got an appreciable diminution in size and the restoration of perfect breathing. That is all that was done in these two cases.

Dr. B. Alexander Randall, Philadelphia: I would like to call attention to a case in which after excision of the tonsil I lost the patient, twenty-two years of age. It seems to me that much of the foregoing discussion points to the occurrence in rather early life, and we need perhaps to emphasize this possibility of a later disaster from it. This young man had two or three tonsil operations at the hands of others under ether, and had come through them successfully. Every care was given to him. There was no suggestion of thymic asthma and his family physician had not found any evidences and the amount of thymus enlargement found after death was not enough to give any mechanical explanation to the fatal issue; yet he suddenly died twenty hours after the operation.

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LARYNGOCELE VENTRICULARIS.

BY GEO. E. SHAMBAUGH, M.D.

The ventricle of Morgagni has as a constant feature a prolongation from its anterior lateral aspect, to which the term appendix ventriculi has been applied. The direction of the appendix is upward and backward. It varies widely in size and shape, not only in different individuals but on the two sides of the same larynx. Occasionally it exists only as a small indentation. On the other hand it is sometimes quite large, with several prolongations. As a rule it does not reach the upper margin of the thyroid cartilage but occasionally it presents a prolongation far beyond the upper margin of the thyroid, up as far as the hyoid bone and even to the base of the tongue. The appendix of the ventricle appears to be a mechanism for supplying moisture to the vocal cords in order that these structures may be better able to perform their function.

The term laryngocele ventricularis was applied by Virchow to the cases where the appendix presented a prolongation extending to the upper border of the thyroid cartilage, or occasionally to the hyoid bone, and was described by him as pathological. The condition described by Virchow under the name of laryngocele ventricularis appears to be only an anatomical variation of the normal physiological appendix of the ventricle. The term laryngocele ventricularis may well be preserved, however, as applying to the pathological condition here under discussion, consisting of the cystic dilatation of the ventricular appendix.

The pathological distension of the appendix of the ventricle into an air containing cyst, appears to be a very unusual disease. Hipple, in the Deutsche Zeitschrift fur Chirurgie, 1910, gives a very complete review of the subject. In the entire world literature on the subject Hipple was able to find but twenty cases reported. Eight of these were discovered

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at autopsy, leaving but twelve cases that had been recognized during life. In thirteen of the cases collected by Hipple the condition existed only as an extra laryngeal enlargement in the neck and eight of the thirteen cases were discovered post-mortem, leaving but five that had been recognized during life. Four of the twenty cases, all seen during life, presented both an extra and an intra-laryngeal enlargement. There were but three of the twenty cases where there existed only an intra-laryngeal enlargement with no swelling in the neck.

In the etiology of the cystic enlargement of the appendix of the ventricle there appears to be two important factors. The first is a predisposing cause, the presence of an anatomical variation, consisting of an elongated appendix. The second is the active cause, consisting of a forcible distension with air of the ventricle of Morgagni. This forcible distension may take place in several ways: such as violent spells of coughing, the playing of wind instruments and even the application of the Politzer method for inflation of the middle ear. In the case reported by me the condition was produced by a violent fit of coughing.

The symptoms occasioned by a laryngocele of the ventricle depends upon whether the process is extra or intra-laryngeal. When the process is entirely extra laryngeal the symptoms are those occasioned by the swelling in the neck. This swelling appears above the upper margin of the thyroid cartilage, where the elongated appendix has broken through the thyro-hyoid membrane. The swelling occasions some stiffness of the neck, and as a rule it can be reduced by the application of pressure, which forces the air into the larynx where its escape produces a whistling sound. In these cases there are no laryngeal symptoms nor can anything abnormal be detected by inspection of the larynx. In the cases where there exists an intra-laryngeal distension, symptoms referable to disturbance of the function of the larynx at once appear. These symptoms are first of all an alteration of the voice, consisting of a more or less marked degree of hoarseness. When the intra-laryngeal swelling becomes large enough there develops in addition to the hoarseness some difficulty in breathing. The

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onset of the trouble is usually associated with some sensations of pain. A very annoying complication is the occurrence of pus infection of the laryngocele, which persists as a chronic abscess discharging, day and night, quantities of bad-tasting pus into the throat, which has to be continually coughed up. A temporary relief from this disgusting symptom can be gained by pressure applied to the swelling in the neck, by which the laryngocele can be partially emptied.

Case Report.—Mrs. W., age 69, consulted me December 13, 1913, complaining of the following symptoms: Very marked hoarseness and a sensation of fullness in the throat, associated with a profuse discharge of foul pus which she was required to cough up constantly from the larynx. There was an external swelling in the neck about the size of a hen's egg, located just above and lateral to the upper rim of the thyroid cartilage. The escape of pus was in part spontaneous and in part it could be expressed by pressure of the hand on the external swelling in the neck. She was able in this way to evacuate as much as a fourth of a tumbler of pus at one time. This would relieve her temporarily of the fullness of the throat and there would be a partial, but temporary, cessation of the discharge of pus into the throat. The annoyance which was occasioned by the loss of her voice and by the sensation of fullness in the throat, was slight as compared to the great suffering produced by the constant escape into the throat of quantities of foul pus. The annoyance was much greater at night, when her sleep was constantly disturbed by the necessity to cough up the pus.

The history she gave was briefly as follows: Since girlhood she had been subject to temporary attacks of hoarseness, coming on usually once or twice a year and lasting sometimes as long as a week, associated usually with symptoms of head cold and pharyngitis. For about twenty years she was relatively free from attacks of this sort, until three years ago, while traveling in Ireland, she developed a hoarseness, associated with severe coughing spells. After one of these coughing attacks she noticed for the first time a sense of pressure and fullness in the throat. For some time after these symp-

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toms developed there would be periods when they would largely subside, but they never entirely disappeared. The hoarseness was always more or less relieved when the other symptoms subsided. On one occasion, while looking upward, with her head tipped back, she experienced a collapse of the swelling in the throat and with this came immediate return of the voice. One year after onset of the trouble the swelling in the larynx was operated on twice by one of our local laryngologists. The operation was followed by a collapse of the swelling in the throat and return of the voice. The relief was, however, only temporary as the original condition soon returned. A couple of months after the last operation an infection in the throat took place and since that time the cyst has been discharging large quantities of foul pus into the larynx. After the failure to get relief by the intra-laryngeal operations she consulted the general surgeons, one of whom attempted to give her relief by an external operation. What was done I do not know; the external scar is showing but the external pouch was not removed.

Inspection of the larynx disclosed a swelling about the size of a walnut, springing from the right side of the larynx. The left side of the epiglottis was doubled over by pressure of the swelling external to the ary-epiglottic fold. About two-thirds of the cavity of the larynx was filled by the mass, which completely obscured the view of the right vocal cord and permitted only an occasional glimpse of the left cord. The surface of the swelling was smooth and by pressure could be readily indented, showing a cystic condition. Some idea of the appearance in the larynx can be gotten from this drawing made from inspection of the larynx by means of a laryngeal mirror.

The diagnosis was made of a diverticulum of the sinus of Morgagni, a laryngocele ventricularis, with extension of the pouch through the thyro-hyoid membrane, forming a swelling externally in the neck. In view of the existence of the extra larnygeal pouch, it did not seem probable that any very decided relief could be obtained by an intra-laryngeal operation alone, such as had been attempted twice previously without relief. We decided, therefore, to remove the large pus-secret-

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ing pouch in the neck and later to attempt to reduce the size of the intra-laryngeal swelling. The operation for the removal of the pouch in the neck was successfully carried out by Dr. Dean Lewis, December, 1913.

The result was a decided improvement in the sensation of fullness in the throat, as well as in diminishing the amount of pus discharging into the larynx. On January 9, under cocaine anesthesia, an attempt was made to reduce the size of the intra-laryngeal swelling. My first aim was to open the pouch from below up throughout its entire extent. This I succeeded in doing by using a hooked-shaped laryngeal knife, made for me. This knife was introduced into the larynx and caught into the lower part of the swelling, and by withdrawing the instrument from the larynx the pouch was split to its upper surface. There was an immediate collapse of the cyst and a return of the voice. By using the Krause laryngeal double currette, the edges of the incision were removed piece by piece until an opening about one-half inch wide had been made. The operation consumed altogether about an hour, as a delay was occasioned after each step because of the bleeding, which provoked coughing as long as it kept up.

The improvement in the laryngeal symptoms was more marked for the first few weeks after this operation than later. It is evident that a complete removal of the laryngeal pouch by an intra-laryngeal operation is not feasible. The remaining portion of the intra-laryngeal pouch is again filled with pus, as we should expect. The permanent improvement in the patient's voice has not been as much as we had hoped for. On the other hand the improvement in the most annoying symptom, the secretion of pus into the throat, has been very great. The patient is now able to sleep without being wakened constantly by the secretion of pus. The size of the swelling in the larynx is perhaps one-third what it was before the effort was made to reduce the size by the intra-laryngeal operation.

Discussion.

Dr. E. Fletcher Ingals, Chicago: I had a similar case, but without infection, a few years ago. I treated it by aspirating

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the cyst, and then injecting it with equal parts of 95 per cent carbolic acid and glycerine. I got an excellent result at that time, but he came back to me within the past month. The cyst is now altogether intra-laryngeal and about as large as a filbert. I think the operation must be repeated by and by.

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LARYNGITIS SUBMUCOSA SUBGLOTTICA ACUTA.

BY CHARLES W. RICHARDSON, M. D.

Under the above name we recognize an acute catarrhal inflammation of the larynx, affecting to a great extent, the submucous layer of the subchordal portion of the laryngeal mucosa. This type of laryngeal affection has been recognized for many years, first having been described by Bayles in 1808, although, through his description, there was no clear differentiation between this purely catarrhal affection and the serous infiltration. As men began to differentiate this condition from oedema, and other allied affections; the inflammatory changes in the larynx of the more severe type, especially those affecting the submucosa, were given various designations. Thus Burow describes the condition as chorditis vocalis inferior; Von Ziemssen as laryngitis hypoglottica acuta gravis; Rauchfuss as laryngitis subchordalis acuta; Curveilheir as laryngitis submucosa subglottica; and Gottstein as laryngitis submucosa acuta. It has always seemed to me that the name applied by Curveilheir describes most accurately the affection, and, for that reason, I have employed it. Many authors still describe this affection under acute laryngitis, recognizing it as a more severe type of that affection. Early in my professional career, when I was doing a great number of intubations, I was brought in contact with cases which, while suffering from marked stenosis of the larynx with stridulous breathing that possessed, nevertheless, very few of the characteristic symptoms of true laryngeal diphtheria. Culture investigation gave a negative result in these cases. The use of the laryngeal mirror, to which I resorted early in the investigation of these cases, and which can be employed at almost any age, enabled me to recognize the nature of the invasion in all subsequent cases which came under my observation.

These cases had been described as cases of false croup; as due to incurvation of the epiglottis—whatever that might be;

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as true cases of laryngeal diphtheria, which the bacteriologists were in fault in not finding the Klebs-Loeffler bacillus; as strumous laryngitis and laryngitis stridulous.

Aetiology.—The most frequent cause of this type of laryngeal inflammation is the same as those that bring about the acute laryngeal catarrh. In most cases we have only the evidences of a severe, acute laryngeal catarrh, which has extended into the submucosa, localizing itself more intensely in the subcordal region of the larynx. Overexertion of the voice during the existence of a simple laryngeal catarrh, or reinfection from fresh exposure, is very apt to cause the extension of the simple into the more severe type of submucosa catarrh. The exanthematous disease, scarlet fever, whooping cough, and especially measles, may have this affection as a sequela. Foreign bodies, inhalation of various chemicals, irritating gases, acids, hot water, smoke and steam may be the active mechanical cause of such a disturbance.

The whole interior of the larynx presents the characteristic evidences of an acute laryngeal catarrh, but it is in the subcordal portion that the characteristic lesion is seen. In a fair proportion of the cases that have come under my observation, the hypoglottic portion of the larynx presented only a moderate degree of inflammation, the cords themselves only showing slight change in color. Below the vocal cords can be seen two symmetrical bright red masses, which approach toward each other so as to almost meet throughout in the middle line. Upon the degree of the subcordal swelling and the narrowing of the lumen of this portion of the larynx is dependent the intensity of the symptoms.

The affection, which is manifested most frequently in children, is usually ushered in with the symptoms of an acute laryngeal catarrh, hoarseness of the voice, soreness or tightness in the larynx, croupy cough, and stridulous respiration. These symptoms endure for from twenty-four to forty-eight hours, when they begin to partake of a more severe character in that the respiration becomes more stridulous and the breathing more embarrassed. The embarrassed respiration is more marked at night or when the patient is in a prone position.

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In the more severe cases the breathing becomes markedly embarrassed and attacks of suffocation ensue, the face becoming cyanosed with delirium and loss of consciousness, which finally deepens into coma and death, unless relief is afforded through intubation or tracheotomy. One feature has always impressed me in this affection and that is that the voice is never markedly affected. It may be more or less hoarse, but is never aphonic. The general symptoms are not very marked. There is usually some temperature between 100 or 102 degrees F. The pulse is quick-bounding and full-volumed. The appetite is not much impaired, and most children—with only moderate interference with respiration—do not seem very ill and will persist in playing, although their breathing is quite stridulous. The general facial appearance is fair, and, while the character of the breathing sound would lend the belief that there is considerable interference with the exchange of air, it is not manifested from the appearance of the color of the face. The diagnosis is made through the examination of the larynx with the laryngeal mirror. The differentiation of this condition from diphtheria is readily made. The laryngeal diphtheretic is usually quite ill, has only a very moderate temperature, a slow, soft pulse, is usually pale and quite anxious, and manifests no desire for food. The stridulous breathing is not uniform, being attended with occasional paroxysms of extremely difficult respiration.

In subcordal inflammation the child has not the appearance of being seriously ill, usually has quite a temperature, a full, firm-bounding pulse, the facial expression is good and the color not altered, the stridulous breathing is quite uniform, if anything gradually and progressively growing worse, with only occasional paroxysms of difficult breathing.

In laryngeal diphtheria the inspection reveals the presence of false membrane, and the result of culture examination shows the presence of the Klebs-Loeffler bacillus.

In subcordal inflammation the inspection demonstrates the presence of the bright red bands immediately below the vocal bands, more or less approaching the middle line. The culture examination is negative.

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In most cases the progress of the disease is marked, first, by an apparently severe attack of acute laryngitis, which lasts for about twenty-four hours, when the stage of strident breathing becomes manifest. With the stridulous breathing we also have the cough becoming more bellowing in character. This stage usually reaches its maximum of intensity within thirty-six hours. The retrocession of the process varies from twenty-four to forty-eight hours. Many of the mild cases, except for the alarming cough and strident breathing, would give no anxiety. The children are not very sick and are anxious to be about their usual habits of life. Several children in such condition have been brought to my office for consultation. In these mild cases, although the breathing may seem to be markedly impaired from the character of the stridor and the pictures of the subchordal swelling, the countenance is quite ruddy and the lips of the normal red tinge. In the more severe types, when the breathing begins to tighten up, the progress of the case from bad to worse is very rapid, and we then have the usual picture which is manifested in laryngeal stenosis, however produced.

The prognosis is very favorable for complete recovery. The mild case, if seen early enough and recognized, should, under appropriate treatment, respond rapidly. Unrecognized, neglected, or cases seen at first in the severe form, should, under appropriate surgical and general care, make complete recoveries. A fatal termination is rather unusual.

Treatment.—The child should be kept abed in a warm room in which steam is generated. Where steam heat is employed this can readily be accomplished by allowing the valve on the radiator to be slightly opened. The diet should be restricted to liquids and the bowels kept well opened by calomel and salines. Locally the larynx should be touched with a one per cent solution of silver nitrate once a day, if the child be old enough to permit the application being made. An ice bag should be worn over the larynx continuously. I always give ammon. bromide and carbonate with tincture of aconite internally. If the breathing become very stenotic, intubation becomes necessary. If it become labored over many hours,

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I believe intubation should be done to relieve the little sufferer. In one case I fear I delayed this relief quite to the danger point.

I will close the consideration of this subject with the history of four cases, so severe in their character that they came to surgical intervention.

On December 5, 1890, I was requested by Dr. Price to see his two children, who were suffering from laryngeal diphtheria, with marked obstruction to their breathing. The children were five and seven years of age, respectively. They presented all the evidences I had learned to connect with the existence of laryngitis submucosa subchordalis. Examination of the larynx proved my conclusion to be correct, but, in order to prevent a possible error in diagnosis, a culture was made in both cases. The children were put to bed in a warm room, with moist air, a saline purgative given, an ice bag applied over the larynx, and the following administered internally:

Ammonii bromidi	1.00
Ammonii carbonatis	1.00
Tinct. aconitis	.50
Glycerinae.....	8.00
Aquae.....	62.00

Sig.: Teaspoonful every twenty minutes until six doses are taken, then every two hours.

The morning of December 6 I received notice that the cultures were negative. About noon of this day I saw the children. The older had improved greatly but the younger was not so well. The breathing in the younger child was more stridulous, the "riding" of the larynx was more marked, and the sinking of the supra-clavicular spaces and supra-sternal notch more marked. It had grown very restless. Although its color was good and I thought it still had a good chance for avoiding intubation, I introduced a tube at the urgent request of the father. The child was ex tube in five days. Both children recovered.

In April, 1894, I was requested by the late Dr. W. W. Johnston to see a case of laryngeal diphtheria, in which he had received a negative culture. The laryngeal examination

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on this two-year-old child was negative as to diphtheria, so far as the inspection could be made. The hypo-larynx and the cords could be fairly well seen but it was impossible to view the subcordal portion of the larynx. Although the breathing was quite distressful and the child very excitable, it was thought desirable to delay intubation. As Dr. Johnston was firm in his views as to the diphtheretic nature of the invasion, three thousand units of antitoxin were given and the usual treatment instituted. I spent the night with the child. We decided at 10 a. m. the following morning, on account of the increased difficulty of breathing, to intubate the child. The tube was removed on the fifth day. Several subsequent cultures were made, with negative results.

March 22, 1898, I was called to see a case of difficult laryngeal breathing, the patient being under the care of Dr. R. T. Holden. Dr. Holden stated that the child, seven years old, had passed through a moderate case of measles. When convalescence was nearly assured, it contracted an acute laryngitis, which, for several days, had grown gradually worse. For two days the breathing had been very bad. Cultures negative. At 10 o'clock he asked me to come and intubate, as the child was growing weary from the continued effort at breathing. At 1 p. m. I reached the patient's home. Breathing was very labored and the countenance was slightly cyanosed. I made a laryngeal inspection and found the characteristic picture. The effort of examination was followed by an intense paroxysm of difficult breathing, which made it necessary to resort to immediate intubation. The child was extubated in six days. This case was most interesting from the almost normal character of the voice.

In November, 1912, I was summoned by Dr. S. S. Adams by telephone at 11:45 P. M. From the character of his voice and his spoken words, I knew delay meant death. I responded to his summons with great rapidity, and, had I been a few moments later, I would not have been needed. This case is most interesting, from several points of view. When this child was four years of age, I saw him in a similar attack, from which he recovered through the treatment then instituted. In the latter illness, which occurred when he was nine years of

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age, the symptoms were identical with his former attack, and Dr. Adams treated him for several days. This second invasion occurred as a sequela to measles. On Sunday, as his breathing had become very labored, and as the boy complained greatly of his want of air, Dr. Adams requested me to see the patient with him at noon. His breathing at this time was quite strident, his cough extremely bellowing and constant, but his countenance was of good color, although beaded with drops of perspiration. Another interesting feature in this case was his almost normal voice. The picture of the larynx was a perfect one of laryngitis subchordalis. His age and general condition, as well as his recovery from his previous attack, caused us to hope that he would tide over this attack without resorting to extreme measures. He gradually grew worse, as the parents informed us, until about 11 o'clock, when he became delirious, and this excited their gravest apprehension. When I reached the patient I was truly astonished at his perilous condition. He was profoundly unconscious, intensely cyanosed, and simply gasping an occasional breath. I only took time to introduce the gag and quickly drove home the intubation tube as he lay prone in the bed. A few efforts at artificial respiration started up the rhythm of the breathing again. He was extubated in five days. Uneventful convalescence.

These four cases will be sufficient to indicate the gravity which this condition sometimes assumes. I have, in all, intubated eight times for subchordal laryngitis. Most of the cases which I have seen in consultation have, under the appropriate local and constitutional treatment, subsided without resorting to surgical intervention.

Discussion.

Dr. Thomas H. Halsted, Syracuse, N. Y.: There is below the cords, normally, a deposition of lymphoid tissue, and this tissue is subject to the same kind of acute and chronic inflammation, with acute swelling and chronic hypertrophy that is met with in the faucial and pharyngeal tonsils. Children with well-marked enlarged tonsils and adenoids are likely to have an enlargement of this subchordal tonsil, if we may speak of this subchordal lymphoid tissue as a tonsil. Consequently the

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pathology of the acute subchordal laryngitis to which the writer of the paper did not refer, is the same as the pathology of acute tonsillitis. We have the acute swelling, redness, projecting below the cords toward the median line; and the smaller the child and the smaller the trachea, the more serious will be the symptoms of obstruction, dyspnoea, stridulous breathing, while the vocal cords themselves may be little affected and the voice quite, or nearly, quite normal.

I have seen a number of cases in children with the same symptoms and urgent dyspnoea requiring intubation, as those described by the author of the paper. The great majority of the cases subside under steam inhalations, rest in bed, free catharsis with calomel, but not all of them, and particularly those following measles when intubation may be required. I have twice been called to intubate in small children, one eight months of age, the other one and one-half years, where repeated cultures had shown the absence of the Klebs-Loeffler bacillus, where an examination with the mirror had disclosed an absence of pseudo-membrane, white vocal cords and a subchordal swelling. A close investigation of the history, especially of the onset of the dyspoea, which in both cases was sudden, led to a diagnosis of a foreign body. In the eight months child, direct laryngoscopy revealed a fish bone in the trachea below the cords, and its removal was followed by subsidence of the swelling and recovery of the patient. In the year-and-one-half child I did a tracheotomy, feeling confident of my diagnosis of a foreign body, and removed three small pieces of egg-shell with subsidence of the swelling and recovery of the patient. This case occurred prior to direct laryngoscopy. Intubation was contra-indicated in these cases. Consequently, before doing intubation it is well to have in mind the possibility of a foreign body as the exciting cause of the swelling.

In the case of a young man, brought to the hospital with acute dyspnoea of laryngeal type and clear voice, a hurried examination disclosed a laynx without swelling above the cords, normal vocal cords, but two symmetrical red swellings below the cords. The patient was hurried to the operating table and an immediate tracheotomy done, the intubation instruments not being at hand. This man's life was saved only by the prompt relief. So sudden was the onset and rapid progress that I have sometimes thought it probably a case of angio-neurotic edema localized below the cords.

These cases, described in the paper, are always anxious ones, and the question of diphtheria always comes up. It is

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important, as the author has called attention to, to make a diagnosis and inspection either with the mirror or by direct laryngoscopy and should always be done. If there be any doubt whatever regarding diphtheria the child should be given the benefit of the doubt and given antitoxin, but before resorting to intubation, a foreign body as the exciting cause of the inflammation should be considered and excluded. If a foreign body is believed to be the cause, and the case is so urgent that direct laryngoscopy is not immediately available, then tracheotomy is the operation to be done. If it is a case, pure and simple, of inflammatory swelling of the submucosa, or of the lymphoid tissue below the cords of pathogenic origin, then intubation is the operation, provided the other local remedies, ice, steam, etc., have been ineffective.

Dr. Burt R. Shurly, Detroit: Ordinarily general practitioners differentiate between acute laryngitis and membranous laryngitis, but this particular difficulty is not one that is ordinarily differentiated. Those of us who have done intubation work realize the peculiar conditions found in the subglottic region of the larynx, and the loss of voice in these cases is apparently the symptom which attracts our attention to this variety of laryngitis, and one which would put us on our guard as to the proper differentiation. Of course, these cases for the most part are those which are met in the homes of patients, and the difficulties of examination and actually observing the swollen ring is quite apparent, and usually we have been called to these cases to do an intubation or for some operative interference for a case of membranous laryngitis. The danger of not differentiating is a very great one, because by far the high mortality would come on the side of the membranous form of inflammation. I have intubated a number of these cases that were decidedly urgent and where this was the only thing to do to save the life of the child; the greater number of these cases got well with intubation. The point of doing early intubation is well taken, from the fact that a child suffering from long-continued dyspnoea is in great danger of developing a pneumonia or some pulmonary condition. Of course, the differentiation from a foreign body is also a thing which should be prominently in mind.

Dr. Emil Mayer, New York City: There is one condition that has not been brought out, which is exemplified in a case under my care. A nurse in the Mt. Sinai Hospital had a good deal of dyspnoea and it was suspected that she had diphtheria, although the cultures were negative. She was placed at once in isolation, where I saw her. Examination of the larynx

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showed the swelling Dr. Richardson has mentioned, and I felt it might show itself to be a case of subglottic infiltration. Nevertheless, I took the swab of the ordinary diphtheria culture outfit, bent it at right angles, and introduced it below the cords into the trachea, and got the cultures of Klebs-Loeffler bacilli there. There was nothing high up in the larynx, but it was in the throat. She went through a most terrible time, but eventually recovered.

In regard to the treatment, I do not recall that Dr. Richardson brought out the great benefit from small doses of adrenalin applied directly to the part, and when the acute inflammation has subsided, the advantage that iron locally produces in the healing of these conditions as the patient improves.

Dr. William E. Casselberry, Chicago: I am certain, as is Dr. Richardson, that this disease should be described as an entity deserving of a name of its own. It is true that in false croup or spasmodic laryngitis there is often that swelling beneath the cords, but when the condition is not at its worst the child breathes freely, especially in the daytime, the attacks being paroxysmal. In the non-diphtheritic membranous form of laryngitis one cannot be so certain because the membrane covers the subglottic portion, but on the wane and in the beginning I have seen the subglottic inflammation or swelling present in it. But it is not always a false croup, or non-diphtheritic croup, or spasmodic laryngitis; the distinction which the essayist makes as to the progression of the dyspnoea—its constancy, is the best clinical distinction between subglottic laryngitis and the other forms just named. I wish to mention a point with regard to the difficulty of examination with the mirror in children. In nearly every case one can get a view of the larynx by gentle depression of the tongue rather than by drawing the tongue forward over the teeth in the conventional manner. The same is true in certain adults with supersensitive throats.

The disease is by no means limited to children. I have seen several well pronounced cases with fair voice and continuous dyspnoea in adults. I remember a woman who gave a history of being subject to what she called croup which would last about a week during which at times she would feel that she must suffocate. The mirror showed a typical picture of subglottic laryngitis.

Dr. Henry L. Swain, New Haven: Thirty years ago, when I first learned to look into a larynx, there were certain cases known as chorditis hypertrophica inferior; they went though acute exacerbations. Since then I have only very rarely seen these cases in adults where they have the history of attacks

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of choking. I always thought them acute exacerbations for which there seemed no very good remedy. In two cases I remember using almost full strength solutions nitrate of silver, and in one the galvano-cautery, but I reduced the chronic hypertrophy only very slightly, if at all.

Dr. Thomas Hubbard, Toledo: This condition is more common than is usually supposed. I have several cases (children) in mind which I labeled subglottic edema. Two were treated in the routine way as though diphtheritic. In two cases in particular there was a copious flow of clear yellow serum immediately upon the introduction of the tube (half an ounce at least), and there was no mistaking it. Diagnosis of subglottic oedema can be made with the mirror even in children. I would take issue with the method of treatment as stated by Dr. Richardson. Rather too stimulating. I think the proper line of treatment should be copious diaphoresis with relaxing expectorants. A jaborandi sweat is very beneficial. Apomorphia is the ideal expectorant. Stimulating expectorants are positively contraindicated in the inflammatory stage. We are under obligations to Dr. Richardson for presenting this timely subject in such a clear and instructive manner. Careful study will discover many of these cases ordinarily classified as diphtheria or a pharyngeal phlegmon, or less definitely subglottic oedema.

Dr. Charles W. Richardson, Washington (in closing): I wish first to endorse what Dr. Casselbery has said. He suggests passing the mirror into the pharynx and raising the epiglottis in order to get a rapid view.

Really, although Dr. Hubbard thinks his treatment differs from mine, he agrees most thoroughly because my method of treatment also produces diaphoresis, the cold only being applied locally.

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PRIMARY SARCOMA OF THE TRACHEA.

BY J. M. INGERSOLL, M.D.

In 1906, Dr. C. F. Theisen presented a paper on "Tumors of the Trachea" to this association. This paper is so complete and comprehensive that, with his permission, I shall quote some parts of it.

Dr. Theisen says: "Tracheal cancer appears to favor the male sex; out of the cases collected by the writer, men were afflicted about twice as frequently as women. The youngest patient was twenty-eight years old, the average age, however, being from the fiftieth to the sixtieth year. Many more cases occur between these years than between the thirtieth and fiftieth."

"The favorite seats for primary tracheal cancer are the upper parts of the trachea and the lower parts close to the bifurcation. The middle third is rarely involved."

"Although primary tracheal sarcoma is rarer than carcinoma, we have been able to collect eighteen cases from the literature. Gleitsmann has reported one of the few cases of tracheal sarcoma operated upon endotracheally. The tumor in this case, that of a man aged fifty-two years, was situated in the upper part of the trachea and nearly filled its lumen. It was as large as a small walnut."

"Both sexes seem to be equally afflicted with tracheal sarcoma and young people rather more frequently than persons more advanced in years. Occasionally the tumors are pedunculated. They often reach a considerable size and almost completely fill the tracheal lumen."

"A study of the cases also shows that the tracheal tumors are situated in the majority of the cases in the upper part of the trachea and less frequently in the lower part. They most rarely occur in the middle of the trachea. They are attached

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most frequently to the posterior wall, which is rich in mucous glands. This is particularly true of the carcinomata, which appear to take their origin from these mucous glands."

"The rarity of tracheal tumors becomes much more striking when the 89 benign and 46 malignant tracheal tumors are compared to the 10,747 benign and 1,110 malignant laryngeal tumors which Semon collected between 1862 and 1888."

"The malignant tumors of the larynx represent only about 11 per cent of the total number, while in the trachea, according to the cases collected by the writer, they represent about 50 per cent of the total number. These figures are significant, because they show that a strong suspicion of malignancy must always attach to a tracheal tumor."

"The fibroma or fibrous polyp is usually pedunculated, and Schroetter has reported a case of a distinctly pedunculated sarcoma which was freely movable. In Proebsting's case an apparent polyp with a long pedicle, which had been coughed out, was found to be carcinomatous."

"Sarcoma usually occurs as a growth with a broad base and smooth surface. It grows slowly, sometimes becoming very extensive, however, and shows little tendency to ulceration."

"As statistics show that over one-half of all cases of tracheal neoplasms are situated in the upper third of the trachea, a low tracheotomy would relieve the patient's breathing in a majority of the cases."

Since Dr. Theisen's paper was written five cases of malignant tumors of the trachea, all of them carcinoma, have been reported.

Dr. T. Passmore Berens reported one case to this association in 1909. The other cases were reported by Kaunitz, Simmell, Eidesheim and Nager.

My own case was one of sarcoma of the trachea in a man 32 years old. When he consulted me he said that he had had a persistant, troublesome cough for several months and during this time he had had three very severe, prolonged attacks of paroxysmal coughing. In each of these attacks he had finally coughed up and expectorated what he called a "polyp." He corroborated this statement by showing me the polypi which

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he had expectorated. They were irregular, slightly nodular masses. The smallest one was about 1.5 centimeters in diameter, the largest one was 3 centimeters long and 1 centimeter thick, tapering down to a small pedicle at one end.

His larynx was inflamed and on the left side of the trachea, just below the first ring, there was a pedunculated tumor, quite similar in appearance to the largest one which the patient had expectorated. At this time there were no indications of any involvement of the tissue around the larynx and trachea.

Microscopical examination of the tumors, which the patient brought with him, showed them to be spindle celled sarcoma and an external operation was advised. The patient, however, refused all operative interference.

His physical condition at this time was good but he soon began to have increased difficulty in breathing and rapidly lost weight. One month later he consented to go to the hospital on account of very marked difficulty in breathing, and it was necessary to do a low tracheotomy on him the day after he entered the hospital.

Two weeks later he consented to an operation. Dr. G. W. Crile exposed the larynx and upper part of the trachea and found a broken-down mass of neoplasm extending so widely around the left side of the neck that he decided it was inoperable and the incision was closed.

For a short time after the operation the patient's condition improved somewhat. A little later he began to have difficulty in swallowing, probably due to involvement of the esophagus, became very much emaciated and died about seven weeks after the operation. No autopsy was permitted.

It seems very probable that if the patient had consented to an operation when the diagnosis of sarcoma was first made, that a resection of the trachea could have been done and the whole tumor removed before it had extended beyond the walls of the trachea.

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Discussion.

Dr. D. Bryson Delavan, New York City: The question of malignant disease of the trachea is especially interesting because of its hopelessness. I do not believe that any operation performed on mediastinal malignant growths is likely to save the life of the patient, and I doubt very much, in the case to which we have just listened, that early operation would have effected a cure. These cases are rare. We have all seen them, however, and we know what has been the inevitable result of those truly malignant. It is desirable, therefore, that we should search for some means other than surgery for their management, and here again we are confronted with the very serious difficulties which obtain in the generally recognized means of the treatment of malignant growths in other parts of the body. The use of radium, as we well know, is not successful in all classes of malignant disease; some growths are benefited by it and some are cured, but there are some types which, as yet, have resisted its influence. More than that, even if radiation might be beneficial the location of the growth in the trachea might be such as to make the application of radium very difficult. The treatment of growths of the larynx, whether malignant or not, by means of radium, even in the hands of the most expert users of radium in the world, presents great difficulty in the making of the proper exposures of the radium to the growth. If such be the case in the larynx the difficulties in the trachea are increased, even though the applications be made through an incision in the trachea. The use of the X-ray, while palliative and beneficial to a certain extent, is admitted to be powerless to cure certain types of growth. This brings us to the chemical treatment of malignant disease. In view of the difficulties in the way of the treatment of malignant growth in the trachea if, in any part of the body, the desirability of some remedy for the treatment of cancer of a chemical

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nature is forcibly presented. Some day we will have such a remedy. The value of arsenic is well known. It is a time honored remedy in malignant trouble and one of the things which may promise hope in the future. In the case of malignant disease of the trachea some remedy either of the nature of a serum or chemical will in the future be the sovereign resource rather than surgery.

Dr. Chevalier Jackson, Pittsburgh: We are indebted to Dr. Ingersoll for reporting this case, because of the very great rarity of this affection, if we exclude from consideration the malignancy of the trachea which is an extension downward from the larynx or inward from the mediastinum. In my own experience I can recall but a single case in which I was sure it was primary in the trachea. I have seen a large number of cases of malignant disease of the trachea, but always as an extension.

I feel compelled to agree with Dr. Delavan in the hopeless outlook. I cannot imagine the possibility of the cure of even a very small primary malignancy in the trachea when we consider the fact that it occurs, as Dr. Ingersoll says, on the posterior wall, which we know to be full of lymphatics. Lymphatic leakage here is extremely prompt. It is a very different situation, anatomically, from that of a small intrinsic malignancy located in the larynx. When a growth gets to the posterior wall in the larynx it is hopeless of cure because of the rapidity of lymphatic leakage in the party wall.

I hope, also, for the discovery of some sero-therapeutic or chemical cure. I question whether radium is going to accomplish very much in carcinomatous malignancy in this location, though it has a marked effect upon sarcoma. I have seen it used with remarkable results in sarcoma of the larynx. Nearly a year later the site of the cured sarcoma was occupied by an unquestioned squamous-celled epithelioma. Whether this was a coincidence or was due to the use of radium I am unable to say.

Dr. John M. Ingersoll, Cleveland (in closing): What Dr. Delavan and Dr. Jackson have said about the hopelessness in such cases is, of course, perfectly true. I have found as yet nothing which offers as much hope of recovery as an early operation, if the condition can be gotten before it has extended beyond the trachea; in such instances it seems to me the hope of possible recovery is something like, but not as good as in intrinsic malignancy of the larynx.

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STUDIES REGARDING ANAPHYLACTIC REACTIONS OCCURRING IN HORSE ASTHMA AND ALLIED CONDITIONS.

BY J. L. GOODALE, M.D.

The object of the following paper is to review briefly our knowledge of anaphylactic shock, occurring after the administration of antitoxic sera, and to describe some studies which may prove of value in affording indication of the existence of this danger.

The subject of anaphylaxis occupies now a relatively large place in literature, but no general agreement has yet been reached in regard to much of its phenomena. For our present purpose, however, it may be useful to quote the following definition of protein sensitization as formulated by V. C. Vaughan:

"(1) Sensitization consists in developing in the animal a specific proteolytic ferment which acts upon the protein that brings it into existence and on no other.

"(2) This specific proteolytic ferment stored up in the cells of the animal as a result of the first treatment with the protein remains as a zymogen until activated by a second injection of the same protein.

"(3) Our conception of the development of a specific zymogen supposes a rearrangement of the atomic groups of the protein molecules of certain cells in the animal body or an alteration of the molecular structure. In other words, we regard the production of the specific zymogen not as the formation of a new body, but as resulting from an alteration in the atomic arrangement within the protein molecule and a consequent change in its chemism.

"(4) Some proteins in developing the specific zymogen produce profound and lasting changes in molecular structure, while the alterations induced by others are slighter and of tem-

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porary duration, the molecular structure soon returning to its original condition.

"(5) Bacteria and protozoa are living, labile proteins, while egg white, casein, serum albumin, etc., are stable proteins. The proteins of the one group are in an active and those of the other in a resting state, but both are essentially proteins, made up of an acid or poisonous chemical nucleus and a basic or non-poisonous group. The former in its effects upon animals is the same whether derived from the living or the dead protein, and the latter in the one instance induces specific immunity, and in the other specific susceptibility; but the immunity and susceptibility each consists in developing in the animal body the capability of splitting up a specific protein. If the living protein be split up before it has time to multiply sufficiently to furnish a fatal quantity of the poison, the animal lives, and we say that it has been immunized. If the stabile protein be introduced into the animal, it leads to the development of a specific proteolytic ferment, and if enough of it to supply a fatal dose be reinjected after this function has been developed the animal dies. The first or sensitizing dose of egg white injected into an animal is digested just as surely as is the second, but the process goes on so slowly that we see no effect, but, in fact, the first dose has affected the animal profoundly, so profoundly that the change wrought in certain cells of the animal body persists for months, possibly for years, and may be transmitted from the mother to her offspring. We do not say that the animal is sensitized unless some immediate and striking effect follows our treatment, but this is wrong. An immediate effect, especially a fatal dose, on reinjection depends upon the rapidity with which the protein is split up and its poisonous constituent set free. The sensitizing injection leads to the development of a specific enzyme, and the protein of this injection is so slowly digested that the poison set free at any one time is not sufficient to produce any recognizable effect. If time enough be allowed between the sensitizing and the reinjection for the accumulation of a large amount of the specific enzyme, then the protein is split up promptly and anaphylactic shock and death result."

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In the administration of diphtheria antitoxin about one-third of the number of individuals who receive injections for the first time, the so-called "serum fever" is observed in the course of six to twelve days, consisting of oedema and a rash resembling urticaria. Von Pierquet explains this phenomenon on the hypothesis that some of the unchanged serum remains in the body until sensitization is sufficiently developed to bring the effects of the toxine body up to the level of clinical observation.

"This demonstrates that a reinjection is not necessary in order to devolop the state of protein sensitization. The evolution of the specific enzyme begins soon after the introduction of the foreign protein and gradually proceeds, and the liberation of the protein poison increases *pari passu*. It is not until the effects of the liberated poison approach the 'level of clinical observation' that we recognize them, but this is not at the beginning of the process. Sensitization of the body cell probably begins as soon as the foreign protein comes in contact with it. The foreign protein so impresses the body cell that the latter undergoes such changes in its intramolecular structure that it elaborates a new and specific enzyme. The fact that soluble proteins sensitize so much more promptly and efficiently than suspensions renders it probable that cellular penetration is essential to the most thorough effect. The additional fact that relatively dilute solutions sensitize more promptly and more efficiently than more concentrated ones suggest that degree of molecular concentration has some influence upon the processes of sensitization."

Von Pierquet and Schick observed that in individuals who received reinjections after intervals of twelve days or longer, a certain number presented a reaction similar to "serum fever," while occurring several days earlier. In other individuals the reaction appeared within a few hours, often within a few minutes after the reinjection. These latter individuals are fully sensitized, and it is in these that anaphylactic shock should be feared.

The duration of sensitization is apparently unlimited. Darling reports two cases of anaphylactic serum disease occurring over

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six years after primary injection of horse serum; Thaon a case following after four years on a reinjection of tetanus antitoxin. Gillette reports a case of an asthmatic fifty-two years of age, in which death followed in five minutes after the injection of diphtheria antitoxin. In many articles on the subject the statement is made that asthmatics are liable to anaphylactic shock after the injection of horse serum, but no attempt, so far as I am aware, have been made to define with precision the types of asthma which are susceptible. Dr. Valentine of Lexington, Mass., has kindly allowed me to refer to a case occurring in his practice four years ago, in which a boy, sixteen years of age, a sufferer from asthma, was given an injection of diphtheria antitoxin, which was followed by death in the course of a few hours. The patient had never received a previous dose of antitoxin.

In regard to the prevention of anaphylactic shock and its treatment, the following suggestions have been made:

Wiedemann states that in sensitive cases another variety of serum should be employed and reports a case where ox serum was given successfully to a patient who had shown intolerance to horse serum. This serum is prepared by the Hoechst Farbwerke, but is not, so far as I know, procurable in this country. Besredka states that the heating of serum to 56° C. tends to suppress the phenomena of sensitization, and that all the antitoxin prepared at the Pasteur Institute is subjected to this temperature. Anaphylactic shock is said to be less frequent and severe in France than in other countries. The internal administration of serum in intolerant cases has been suggested by Asam, but this might destroy the efficacy of the antitoxic principle from digestion, or else a delayed anaphylaxis might occur, as seems to have been the case in an instance reported by Wiedemann. If shock has occurred the hypodermic administration of atropine has been suggested. In one instance of dangerous symptoms arising from sensitization by thyroid extract, venesection was employed with prompt relief. Ether is also recommended for the purpose of diminishing spasm of the arterioles. In cases of diphtheria where it is absolutely necessary to control the disease, one may be justified in follow-

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ing the recommendations of Rosenau and Anderson of administering a minute dose of antitoxin for the purpose of exhausting the zymogen in the system, and then following this, after the anaphylactic symptoms have disappeared by a full dose of antitoxin. A case reported by Wiedemann, however, shows that even so small an amount as this, when administered subcutaneously, may be attended with danger. A patient three years of age, who two years previously had received 30 cc. of diphtheria antitoxin was injected with one drop. This was followed by severe dyspnoea and cyanosis, although the patient recovered.

In addition to such conditions of sensitization to horse serum, other conspicuous examples occur, such as the intolerance to various pollens found in hayfever and the reactions following the ingestion of certain foods, such as eggs, strawberries, fish and various nuts.

Although the statement is repeatedly found in the literature that asthmatic individuals may show anaphylactic shock after the administration of antitoxic sera, no systematic observations have been made in regard to determining actually when danger may be anticipated. Such an investigation could not justifiably be carried by the subcutaneous injection of horse serum since in the first place alarming symptoms might be occasioned if an excessive dose were administered, and in the second place it is possible that certain individuals might receive the test dose without unusual symptoms, but might thereby be sensitized so that later if diphtheria actually occurred the injection of antitoxin might be followed by anaphylactic shock.

The Von Pirquet test for tuberculosis gave rise to the suggestion that a similar skin reaction might be found in individuals sensitive to horse serum and a number of patients were consequently examined in this manner. On theoretical grounds those individuals who showed vasomotor symptoms in the neighborhood of horses would be most likely to show a reaction and consequently all those of this class of whom I had records were asked to report for the test. Also a number who had a history of vasomotor symptoms of other types were examined.

The tests were made in the following manner:

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1. The lobe of one ear was moistened with a drop of diphtheria antitoxin prepared by the Massachusetts State Board of Health and a superficial scratch one cm. in length was made with a paracentesis needle on the skin.

2. A drop of the same antitoxin was placed in one nostril upon the anterior end of the lower turbinate.

Report of Observations.—Twenty-seven cases were examined by one or both of the above methods. These may be grouped as follows:

1. Cases in which horses had been known to excite nasal vasomotor symptoms or an asthmatic attack.

2. Cases showing no reaction to horses, but in whom the asthma was apparently associated with bronchitis alone, or occurred only during the Summer in connection with hay fever.

Eight cases with a history of sensitiveness to horses were examined with the following results:

Case 1. Miss W., 28. For 8 years asthma more or less constant throughout year, increased markedly by the neighborhood of horses. Has been under observation for six years. A large cystic right middle turbinate was removed in 1909, without influence on asthma. Tonsils were removed for septic detritus four years ago. During past two years asthma has been much less troublesome, and is able to drive behind horses, although the air of a stable excites an attack.

A drop of diphtheria antitoxin was placed in each nostril. Within five minutes the mucous membrane of both lower turbinates and of the septum became pale, oedematous and covered with serous fluid. The clinical picture was that of a typical hay fever, and the symptoms passed off in the course of two hours. A week later a scratch was made in the skin of the lobe of one ear, and the same antitoxin applied. In three minutes the patient stated that the ear itched, and examination showed a white, slightly raised area of the skin immediately surrounding the scratch, while the skin beyond this white area showed reddening and general swelling, the lobe of the ear as a whole being about twice the thickness of the other. Five minutes later the white wheals had disappeared, and the surface of the skin was diffusely reddened. In the course of

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the next hour the oedema of the lobe began to diminish and two hours later had disappeared.

In order to determine whether the skin reaction was due to the trauma itself or to the serum, a few days later a similar cut was made in the lobe of the other ear, but no serum was applied. No change whatever was noted in the surrounding skin. Egg albumen was applied next with negative result. The watery extract of June grass was also tested both on the skin and in the nose with negative result.

The tests with the horse serum were repeated, always with the same result. It was found that if diluted, the serum gave less marked a reaction which also came on several minutes later. A ten per cent dilution with water was sufficient to cause a retardation of several minutes, and while the skin showed diffuse reddening and swelling, the white wheal bordering the cut did not appear. A one per cent dilution still showed local reaction, but proportionately less intense.

In view of the experiments of Rosenau and Anderson, who found that sensitized animals may be rendered refractory if they receive daily minute doses of serum subcutaneously for ten or more days, it was determined to attempt a similar procedure in this case. While it would have been desirable to administer the serum daily hypodermically in order to effect its parenteral digestion, yet this was not possible owing to the fact that the patient lived at a distance and also demurred at the suggestion of hypodermic administration. A ten per cent solution was therefore given for the patient to use in an atomizer, to spray into the throat three times a day a few minutes before meals, in the hope that some absorption of the serum might occur through the mucous membrane of the fauces, and through the walls of the empty stomach without alteration by gastric digestion. During the night following the first day of this administration the patient experienced considerable asthmatic disturbance, but on the following day and for the next two days persisted faithfully with the spraying, although the difficulty in breathing became almost constant. When I saw her on the fourth day the respiration was labored and the chest full of whistling rales. The spraying was then stopped and within twenty-four hours the asthma

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ceased. After a week of freedom from asthma, spraying was resumed, but with a one-tenth of one per cent solution of serum. No asthma occurred, and the strength of the serum was then gradually increased. In four weeks a ten per cent solution was used without exciting asthma. At this time a skin test with a ten per cent solution gave negative results, but the pure serum gave a reaction about equal in intensity to that caused originally by the one per cent solution.

During this period the reaction of the patient to the neighborhood of horses was noted. Making due allowance for the possibility of suggestion, a distinct improvement in tolerance seemed evident. At the present time she can unsaddle her horse after a ride without exciting further vasomotor symptoms than sneezing several times, although such proximity would previously have excited severe asthmatic breathing.

Case 2. Mrs. B., 30. For ten years the neighborhood of horses has produced sneezing, more severely of late, and accompanied by a sense of constriction in the chest. The general health is otherwise good. Horse serum applied to a scratch on the skin produced in six minutes considerable reddening and oedema without the marginal white line of the preceding case. In the nose the serum gave no result. On the following morning the skin test was repeated with the same serum, without exciting any local reaction whatever. This is difficult to explain except on the hypothesis that the first reaction exhausted sufficiently the amount of zymogen in the system. What the dose of serum should be to accomplish this result is doubtful but the amount which could enter the system through a scratch certainly must be extremely small.

Case 3. Mr. F., 47. For many years severe asthma excited by horses. Deviation of the septum and chronic ethmoiditis on the left side. Horse serum applied to a cut of the skin produced in five minutes a marked reaction similar to that of Case 1. A moderate amount of oedema and watery discharge was occasioned by the nasal test.

Case 4. Dr. B., 40. Until five years ago nasal vasomotor disturbances and asthma excited by the vicinity of horses. On several occasions when hunting deer or moose, asthma has been caused by handling the dead animals. Without treatment or known reason this tendency has of late years gradually diminished and horses now cause no discomfort. Tests with the serum in the nose and on the skin caused no reaction.

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Case 5. Mrs. V. Seen first in 1906 for asthma, many years duration. Had had much treatment of nose without effect. In intervals of attacks chest examination was negative. Has had one or two small dogs continually about her. For several years following the first examination, it was observed that on being away from the dogs, she was free from asthma, and an attempt was made to have her dispose of the animals, but without success. In November, five years ago, she was given pollantin by her family physician for an attack of sneezing and moderate asthma. This was immediately followed by exceedingly severe dyspnoea, nasal obstruction, profuse watery flow from the nose, it being the worst attack that she had ever experienced. The symptoms subsided in the course of twelve hours. Two years ago both dogs were disposed of on account of old age, and the patient has since then had no dogs in the house. During this period she has been entirely free from asthma, although a sense of constriction in the chest is experienced when in the neighborhood of horses. When I explained the test which I wished to make, the patient was unwilling to have the antitoxin applied to the nose, as her recollection of the asthma following pollantin was so disagreeable, but consented to have the test made on the ear. Within two minutes after the application of antitoxin to the scratch on the lobe of the ear, a clearly defined, elevated, white area appeared, bordering the scratch, surrounded by a diffuse reddening, the whole lobe becoming symmetrically swollen, this resembling perfectly the appearance on the skin which would be produced by a nettle. Five minutes later the white area became changed to red, as in Case 1, and the local manifestations cleared up slowly in two hours.

Case 6. Miss J., 24. Seen in 1909 for recurrent colds and asthmatic attacks since three years of age, always excited by horses, although also occurring at all times in the year, often without assignable cause. Bilateral ethmoiditis existed, characterized by enlargement of middle turbinates, and polypoid degeneration of the mucous membrane. In 1910 the ethmoid cells were curetted, and the patient experienced complete relief for a period of ten months, when slight shortness of breath developed. One year later, in November, asthma appeared following a cold, a return of polypoid tissue was observed in the right ethmoid region. This was curetted with relief from the asthma. In March of this year, the patient was tested by the methods above described with positive result, one drop of the antitoxin in the right nostril causing a typical vasomotor swelling and pallor of the mucous membrane, completely ob-

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structing respiration on that side, and attended by profuse watery discharge, the other side remaining unaffected. The right eye became suffused together with free lachrymation. The skin test of the ear eveloped in four minutes as a clearly defined anemic area of one-quarter inch in width bordering the incision, and contrasting sharply with the hyperemic neighborhood. The whiteness of this area was especially well defined against the generally reddened lobe, fading in four minutes, leaving a generally reddened oedematous lobe which returned to normal in three hours.

Case 7. G. T., male, 24. Seen in February of this year for acute ethmoiditis, which cleared up after ten days. There was an old right chronic ethmoiditis with polyp formation. Polypi had been removed in the past on several occasions. The patient stated that during the Summer the neighborhood of horses would occasion sneezing, and what he described as asthmatic feelings. This condition was apparently not sufficient to cause much discomfort. The serum test in the nose gave a delayed reaction, occurring in about half an hour, and lasting for two hours later. The serum test on the skin gave negative results.

Case 8. Miss G., 24. Seen last Summer for nasal obstruction and hay fever, aggravated in the neighborhood of horses. During the following Winter she was seen on three occasions for nasopharynegeal catarrh, and stated that she was at this season able to go near horses without symptoms. A serum test of the nose gave no reaction.

Case 9. Miss C. Seen May, 1913, for perennial vasomotor rhinitis, increased by the neighborhood of horses in Summer. No asthma. During the winter is able to come near horses without symptoms. The serum test in the nose gave negative results. The skin test was not applied.

Case 10. J., male, 23, brother of Case 3. In general well. Sneezed since boyhood whenever he is in the neighborhood of horses. No asthmatic symptoms. Submucous resection has been done by another physician one year ago. Except for small septal perforation, nose essentially negative. Introduction of antitoxin into nostril not followed by reaction. Skin test on ear negative.

Case 11. E., male, 60. Hay fever many years. Horses excite sneezing and watery nasal discharge, but no asthmatic symptoms. Chronic non-suppurative ethmoiditis and polypi. The serum tests of the nose and skin were negative.

Six cases of bronchial asthma which gave no history of irri-

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tation from horses were examined by the nasal test with negative results. Five cases of single uncomplicated hay fever received the serum in the nose without exciting reaction.

Summary of Cases.

In five patients with horse asthma the application of horse serum to an abrasion of the skin produced within a few minutes sharply localized oedema and reddening. In three of these cases the introduction of horse serum in the nose caused oedema of the nasal mucous membrane, together with profuse watery discharge and sneezing.

One case of horse fever without asthma gave a delayed reaction to the nasal test (although this was reported and I cannot vouch for it), but was negative for the skin test. A similar case gave a delayed but definite reaction to the skin test but showed no nasal symptoms. Four of the horse fever cases without asthma were negative for both tests. It is worth noting that in Cases 3 and 7 the sister who had horse asthma reacted markedly to both tests, while the brother, whose vasomotor symptoms from horses affected the nose alone, showed no reaction.

Six cases of bronchial asthma and five cases of hay fever were negative for both tests.

Three cases without vasomotor symptoms which had received immunizing doses of antitoxin several months previously showed no reaction to the tests.

The results of these experiments indicate that a localized anaphylactic reaction from horse serum may be occasioned in certain individuals who experience asthmatic disturbances from the neighborhood of horses. The severity of these vasomotor symptoms appears to be a determining factor in the production of the reaction, since patients with nasal symptoms alone do not appear to be sufficiently sensitized to horses to give a positive skin test.

The number of cases thus far tested is too small to justify definite conclusions in regard to the value of these tests in detecting the existence of a state of sensitization to horse serum, but if further studies should confirm them, they should prove

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to be of assistance to the physician who is in doubt whether in a given case it is safe to administer antitoxin. It is therefore suggested that a preliminary skin test with horse serum be made in all patients who have previously received an injection of antitoxin derived from horses, whether tetanus, diphtheria, or plague serum. Furthermore, in the case of patients who are about to receive antitoxin for the first time, inquiry should be made as to whether they have ever been disturbed by asthmatic symptoms when in the neighborhood of horses, and if so they should first be tested.

So far as these experiments go, they would indicate that in horse asthma a dangerous anaphylactic shock may occur after the hypodermic administration of horse serum. In horse fever with nasal symptoms alone, this danger is less or not at all to be feared, and in other types of asthma and of vasomotor rhinitis it is not present.

Discussion.

Dr. Burt R. Shurly, Detroit: I am more than pleased to know that medical research is moving Westward and that Michigan is given credit so liberally for a theory which we have been fed on in the form of egg white, and what it will do to the guinea pig you have just heard. Dr. Vaughan has certainly elaborated one of the most scientific and most practical theories in regard to sensitization and anaphylaxis that has yet been brought before the scientific world, and the remarkable point of it all is that by injecting ordinary egg albumin solution in repeated doses the guinea pig dies in all the phases of severe surgical shock. And the point which was not brought out in the paper is that it is exceedingly dangerous to inject any antitoxin after the ninth or tenth day from the initial dose. It was my pleasure many years ago to do the experimental work on the diphtheria antitoxins which were brought out by a large manufacturing house before they were put on the market, and we had occasion in a large diphtheria service for the first time to observe the very varying effects of antitoxin upon patients, and the very great difference in these effects according to the manufactured product. The product of some laboratories is exceedingly high in cutaneous reaction, erythema, urticaria, and these manifestations of anaphylaxis are decidedly at variance according to the method of manufacture.

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So that, of course the modern methods have greatly eliminated the dangers of sensitization where the reaction is decidedly less. Those of us who have met with an example of what it means to see a death in three to five minutes after the injection of antitoxin certainly carry with us through life a most profound feeling of the very great danger which antitoxin may manifest, and yet in an enormous experience in our own city we have had but one fatal case after antitoxin administration. This was in a man of 45 whom I was called upon to do a tracheotomy, but who had the anaphylactic symptoms inside of three minutes; in about five minutes he was dead. There was no history obtainable of a previous dose of antitoxin. But the very great danger comes in administering a dose after the ninth day, and it seems we have certain definite lessons to learn in the fact that we use horse serum to control hemorrhage, and we use the various kinds of antitoxin in our special line of work, and we should have these definite things well in mind. First, that whenever antitoxin must be given in repeated doses it should be held over after the ninth day. This point is also brought out by Dr. Vaughan in the use of egg white. For some reason sensitization increases in a most marvellous way after the ninth or tenth day, and you will remember that the cutaneous eruption which occurs after antitoxin is almost always to be found on or about the ninth day. Therefore, whenever I give diphtheria antitoxin I always tell them not to be afraid of developing scarlet fever or measles should this rash appear, as it probably will on the ninth day. Second, another very definite thing which we should always have in mind before administering an antitoxin is to inquire if the patient is asthmatic or if he has taken antitoxin.

Again, the condition of the suprarenal glands is undoubtedly very greatly the source of many of these disturbances of sensitization, as shown by Sajous in his elaborate scientific investigations.

Dr. Hanau W. Loeb, St. Louis: I have been very much interested in this subject and I should like to mention an experiment which I once saw which brought this matter of sensitization before my mind most convincingly. I could understand how if an animal was sensitized to any agent being again injected he would die, but in Dunbar's laboratory he made another experiment which was far more convincing. The sensitized animal died in three or four minutes; then he took the urine of that animal and injected it into an unsensitized animal, and that one died in a shorter time, showing the production of a deadly poisonous substance in but a few minutes.

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Dr. J. Payson Clark, Boston: Dr. Goodale told me about his experiments a month or two ago and I was interested. I had the good fortune very shortly afterwards to run across what to me was a most marked case of horse asthma. A young man of 19, who said that he had had asthma from the age of 3 to 10 years, and was cured by going to a health resort in North Carolina and then by an osteopath. Also, when he was a child he could not eat eggs without a sense of constriction in throat and blotches on his skin. For three or four years now, since he was 15 years of age, he can eat eggs, but if he eats them raw he has a gagging sensation in his throat. As long as he can remember he has been very sensitive to a horse or cat. Riding behind a horse brings on an asthma for which he has to go to bed with oppression in the chest, and all the symptoms of a severe asthmatic attack. At the same time he has sneezing and a watery discharge from the nose. The proximity of a cat causes only nasal symptoms. On examination I found the septum deviated and the right and lower turbinals swollen; mucous membrane bathed in watery secretion. I thought I would try Dr. Goodale's skin reaction; I did not get it, whether due to my faulty technique or not, I do not know. Then I thought I would try treatment by hyperdermic doses of horse serum, beginning with a minute dose; I called up Dr. Place, who is the head of the diphtheria wards of the Boston City Hospital, and he told me a safe dose would be 1-1000 of a cc. So I started in making a dilution of horse serum which I got from the Massachusetts State Board of Health. I prepared this solution by mixing the horse serum with normal salt solution, into which I put .05% of phenol; on the first day I also applied some adrenalin to his nose to see what the reaction would be, and gave him a spray of camphor, menthol and albolene. On May 1 I gave him 1-1000 of one cc. with no reaction; on May 2, 1-100 of one cc. with no reaction. I then intended to increase the dose to 1-10 of one cc., then to 1 cc. in successive days until I obtained a reaction, but on May 4 he told me his mother did not wish him to have any more. He was perfectly willing. I then gave him one-fifth of one per cent solution to use in his nose as a spray. He had been completely incapacitated for work because any dust made him sneeze. His father telephoned to me the day before I left Boston to attend this meeting, that his son did not sneeze at all any more and considered himself cured, and was going to take a position the following day.

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Dr. Henry L. Swain, New Haven: It is refreshing to think we may be on the eve of discovering some method whereby we may learn whether we may give antitoxin without having the thing put up to us that through our advice in giving a prophylactic dose a patient has been killed. I have seen one patient so near death this Winter that I tremble to think how close to the brink he was. Now, if from such work as Dr. Goodale presents there is a method found which we will be able to use as a test, when the need of antitoxin comes up, it will be a wonderful addition to our safeguard. Is there any reaction in normal subjects?

Dr. Joseph L. Goodale, Boston: There is no reaction in normal patients. There were three subjects having antitoxin last October in a small epidemic, and the death of one of the boys brought this matter to my attention. Cases which had previously received antitoxin and cases of horse fever without asthma, showed no reaction. One case of mild horse asthma, complaining of sneezing with a little constriction in the chest, developed the reaction 45 minutes after the test. We have thus very marked differences in the promptness with which these reactions appear. With regard to Dr. Shurly's statement that the ninth day is the one when skin reactions are usually found after giving antitoxin, Von Pirquet has shown a marked variation to exist in different individuals. The reactions may appear in a few minutes or a few days, but the ninth day is usually the one when the storing of the zymogen reaches its maximum.

Dr. William E. Casselberry, Chicago: It is gratifying to find a definite step forward in the separation of the different kinds of asthma. In Dr. Goodale's report he differentiates horse asthma from the general asthma class; the horse asthma patients will react to the serum and they are subject to immunization by means of the serum. But as we find many of our patients suffering from horse asthma as well as other asthmas it is important to know, in connection with Dr. Goodale's patient who was an equestrienne and who reacted so favorably to the immunization with horse serum, whether she had asthma in other forms, and whether to these other forms of asthma she showed equal immunization.

Dr. Geo. E. Shambaugh, Chicago: We see this remarkable phenomenon of anaphylaxis produced apparently by various causes. I have recently observed a case in a member of my own family where the condition was brought on by eating grape fruit. The symptom in this case consisted wholly of an oedematous swelling, usually confined to the region of one

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eye. The eye would be partially or completely closed for a couple of days. The oedema extended over to the conjunctiva, covering the eyeball. The trouble lasted a year or more, and could be produced at any time by eating grape fruit. At present she is again quite free from the trouble and can eat grape fruit without any return of the symptoms.

I recall two similar cases where the oedema developed after eating grape fruit but where the oedema was located in the larynx, causing loss of voice and in one case some difficulty in respiration.

Another case I have watched during the past year, but I have been unable to detect the cause. The phenomenon consisted of oedema of the face, with profuse watery nasal discharge, sneezing coming on periodically, often about once each week, and lasting a day or two.

In still another case, with similar oedema of the face, the trouble seemed to arise from attacks of slight sore throat, a mild form of tonsillitis. The tonsils were removed about a year ago and since then the patient has had no return of the annoyance.

Dr. Joseph L. Goodale, Boston (in closing): Replying to Dr. Casselberry's query, my first patient lives on a farm which she manages and it is therefore a little difficult to separate the influence of horses from other influences. But I believe there are two types of asthma in this case, because I have on occasion made her leave the vicinity of the horses, during which times she was greatly improved; nevertheless she still had some asthmatic symptoms. It seems actually now as though she would have more comfort this Summer than ever before.

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Symposium.

EMPYEMA OF THE NASAL ACCESSORY SINUSES IN CHILDREN UNDER FOURTEEN YEARS OF AGE. GENERAL CONSIDERATION.

BY LEWIS A. COFFIN, M.D.

Much good must result from this meeting if only it be known that the American Laryngological Association has seen fit to give a special and considerable consideration to the disease of the Accessory Sinuses of the nose in children. I say this, because those men who see children in the condition leading up to a disease demanding special care and operation have not seemed to grasp the situation. A few months ago I said to one of New York's leading Pediatrists that I was about to write a paper on Sinusitis in children. "Well," he said, "it's a real thing. I have just lately had a case." And then told me when he saw the swollen eye, etc., he had called an eye man, showing that up to that time he had not fully appreciated the situation.

As long ago as 1908 Professor Killian wrote an article on the diseases of the accessory sinuses of the nose of children in scarlet fever. He reported several cases from personal experience and collected the reports of some twenty-five or thirty cases. In 1904 the writer reported four cases operated, and last year reported two others who had developed brain abscess and meningitis, before coming under a specialist's care or before a correct diagnosis had been made, and we who are familiar with rhinological literature know that case after case has been reported the world over, and yet a review of recent books on pediatrics fails to reveal a single article on sinusitis in children.

Kerley in his article on meningitis says it may develop from the diseased accessory sinuses of the nose. The writer does not wish to scold, but it does seem that rhinologists have been pounding away on this subject sufficiently long to have brought the subject more seriously to the attention of the Pediatrist.

The consideration at this time is limited to children under fourteen years of age. This is of course an arbitrary age limit,

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but it so happens that from a developmental standpoint the period divides for practical purposes into two periods of about equal length, during the first of which there is practically no frontal sinus. That is notwithstanding the fact that Onodi has shown that the frontal sinus germ exists at birth, and develops from that time, during the first 6 or 7 years it does not reach into the vertical portion of the frontal bone, and from a therapeutic or surgical standpoint may be considered an anterior ethmoidal cell. The ethmoidal cells and the sphenoidal sinus are present in children, and although smaller than in adult life occupy the same relative position to each other as well as to other anatomical parts of the head.

The antrum is not only smaller than in adult life, but being posterior to and to the median side of the large alveolar cavities which occupy so large a portion of the bones of the face, it has a different surgical aspect than in later life when the permanent teeth have descended and the antrum has developed outward and upward to take the place of the descended teeth. Whereas the alveoli are not accessory sinuses of the nose, they are in such relation to the same, are so frequently diseased and their disease sometimes mistaken for disease of some of the other cavities, notably the antrum, that I feel that they should be at least mentioned in this connection.

During the second period of from eight to fourteen years of age, the frontal sinus develops so as to extend well into the vertical portion of the frontal bone. The permanent teeth descend, the antrum develops and grows so as to occupy a greater portion of the superior maxillary bone and is separated from the upper lip in the supra dental fossa by a very thin plate of bone.

As a rule, we as specialists see disease of the accessory sinuses in children when the disease is well advanced presenting a well marked group of symptoms namely: a discharging nose, pain in or about the head, a swollen upper eyelid with possible exophthalmus and possibly symptoms pointing to brain pressure or meningeal irritation.

It is generally found from the history that the child has suffered from a chronic cold which has persisted from some defi-

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nite time marked as the time when the child suffered from some infectious disease as influenza or one of the exenthemata—the case may present as an acute complication of such a disease.

These cases belong in the emergency class and are best treated by prompt surgical procedure—but the history of these cases and our present knowledge cause one to feel that there was a previous condition or stage of the disease which had it been properly handled might have prevented the more serious phase.

The child during this previous stage of latent or occult sinusitis is in the hands of the pediatrist, and as has been stated the pediatrist has not to date recognized the seriousness of the condition. Can we as rhinologists so blaze the way that a wayfaring man though a pediatrist may not fail to recognize it?

One should be on the lookout for a possible sinusitis as a result of the ordinary colds, also during the course of and as a sequel or result of any of the so-called children's diseases; this applies especially to influenza, diphtheria and the exanthemata.

It will be evidenced by a more or less persistent discharge from the nose, by an intermittent stoppage of the nostrils, by a reflex cough, pain in the head, an unaccounted for range of temperature and there may develop an anaemia, persistent and otherwise not understood.

The above train of symptoms or any number of them in a child should arouse a suspicion of a possible sinusitis and should lead to a most thorough examination of the child to determine if the suspicion be well founded. This may be done by making the ordinary examination of the nose and nasopharnyx. A purulent or catarrhal secretion considerably copious will tend to confirm our suspicion. If now, after the nose has been washed or otherwise cleared of secretion, a negative pressure be applied to the nostrils and more pus or mucus be found in them we may be pretty sure that it comes from some of the accessory sinuses.

From the noses of several children whom I have subjected to this test we have obtained in pure culture streptococci, staphylococci and pneumococci. In going through the wards of our hospital I had noticed that the most catarrhal and most

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anaemic looking children were in the eye and ear wards. It was on these children that tests were made.

This reminds me of a story told me by one of our leading pediatrists who had sent a catarrhal child to a member of this association for treatment. Some time afterward the mother returned to Dr. Pediatrist to say that Dr. Laryngologist says "If you will build this child up, he can stop this discharge." Says Dr. Pediatrist "Tell Dr. Laryngologist that I sent the child to him to have the discharge stopped, so I can build it up." As aids to diagnosis, transillumination and the X-ray may be of great help, especially in children from eight to fourteen years of age.

Treatment of this latent or occult disease of the accessory sinuses in children is of course the prophylactic treatment of the serious condition that we so often see and treat by radical operation.

Treatment of the nose in young children is no easy matter, and when it comes to the matter of douches and sprays in a crying, struggling child, it really seems at times that the choice of the lesser evil causes one to allow the child to go untreated.

Probably the safest and most easily carried out form of treatment so for in use that of the post nasa douche as recommended by Dr. Chappell. This cleans the nose and allows better drainage from the sinuses. Of late I have used with the greatest satisfaction in my practice for the relief of both purulent and catarrhal conditions of the nose and its sinuses, the negative pressure or suction. This treatment in conjunction with autogenous vaccines I am trying out on the children above referred to from our eye and ear wards. Dr. White, house surgeon, on the throat side of the hospital, to whom I am indebted for his interested and painstaking work in the matter, as well as the nurses, are enthusiastic in praise of the results. I have devised an apparatus for the home and bedside treatment of these cases which I shall report at another time.

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PATHOLOGICAL CONSIDERATION.

BY GEORGE B. WOOD, M. D.

Whenever we come to the consideration of diseases of the accessory sinuses as occurring in children, it is essential that we bear in mind not only the anatomy of these cavities, but also their post-natal development and especially the age at which they reach a sufficient size to be recognized as individual cavities. At birth there are present both maxillary antra, though in an extremely small and undeveloped state, and two or three ethmoidal cells on each side. At this time the greater part of the superior maxilla consists of diploic bone with the antra a few m.m. in size occupying a small portion of the internal or nasal wall, being internal to as well as below the eye. The frontal and sphenoidal sinuses are absent. As the child grows the ethmoidal cells not only become more numerous, but also extend both anteriorally and posteriorally. One of the anterior ethmoidal cells reaches above the glabella at about six years of age. This ethmoidal cell later forms the frontal sinus and its full development is probably not reached until puberty or afterwards. The sphenoidal sinus, an independent structure, can sometimes be recognized as a small indentation as early as the first year, but its development is so slow that in the majority of cases it has not reached a sufficient size to be important until the sixth year. On account of the late development of the frontal and sphenoidal sinuses we can exclude possible involvement of these cavities in a large number of cases of the infectious diseases where infection of the accessory sinuses has been suspected.

Before going into the pathology proper it might be well for us to recall the histology of the normal mucous membrane lining the accessory sinuses. There is little difference in its appearance in the different cavities though the sphenoidal contains fewer mucous glands than do the other cavities, the ethmoidal being most abundantly supplied. The mucous mem-

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brane of an accessory sinus consists of a superficial layer of epithelial cells covering a deeper connective tissue layer. The epithelium is of the stratified columnar ciliated type, about three cells in thickness. The columnar cells on the surface are interspersed with goblet or beaker cells though they are not so numerous as in the nasal mucous membrane. The beaker cell is a columnar cell which has undergone mucoid degeneration, and they are important factors in the secretion of mucous. Beneath the columnar cells is a layer of almost spindle-shaped cells and beneath them a layer of cuboidal basal cells. The basement membrane of the epithelium is very thin and delicate so that some authors have stated that it cannot be made out except in inflammatory disease. Physiologically we divide the connective tissue into two layers though anatomically there is no distinct boundary line between the two. The more superficial layer is of looser construction and blends gradually with the deeper and denser layer which forms the periosteum. Scattered rather sparsely through the looser layer are compound racemose glands with long ducts which generally extend for a distance beneath the epithelium before penetrating it and emerging on the surface. Some of the cells near the opening of the ducts show distinct cilia. These glands are more numerous around the openings of the sinuses. There is no real adenoid tissue in this mucous membrane though we frequently find lymphoid cells just beneath the epithelium, sometimes forming more or less circumscribed deposits.

The difference between the pathology of sinusitis in childhood and sinusitis of adult life is dependent upon two anatomical facts, namely, that the accessory cavities in childhood are in a more or less undeveloped state, and second that the bone is softer with a greater amount of diploe, and hence more open to extensive involvement. Therefore involvement of the accessory sinuses in the early years of life is less frequent and seldom of a chronic nature, but when it does occur, destructive lesions of the bone are more frequent.

Arbitrary division of inflammation of mucous membrane into acute and chronic, catarrhal and suppurative classes must be considered more as a matter of expediency than according

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to our knowledge of the pathology of these conditions. An acute inflammation may vary in degree from a simple congestion to a purulent infiltration with ulceration and involvement of the surrounding bone. The condition may tend to quickly recover or it may exist for a greater or less length of time. The continued irritation of the tissues produces certain pathologic reactions, such as hyperplastic fibrous tissue, destructive and formative bone changes, cysts, etc., which are characteristic of chronic sinuitis. It is true that mild or so-called catarrhal inflammations of the mucous membrane may not progress beyond certain degrees, while other inflammations from the very start show a tendency to rapid destruction of the tissues. I would hold, however, that it is simply a matter of degree of rapidity and severity of reaction and depends upon the strength of the inflection or the lack of resistance on the part of the host, and is not essentially a different process.

A mild degree of acute inflammation of the mucous membrane of the maxillary sinus is characterized by congestion with engorgement of the already existing blood vessels and the formation of new capillaries, by an increase in the number of beaker cells of the epithelium, by a certain amount of edema of the connective tissue, by an increased activity of the deep mucous glands, by an increase in the number of lymphoid cells and also probably by the presence of a limited number of polymorpho-nuclear leucocytes emigrating through the epithelium. In the early stages of this condition there is probably no increase in the contents of the cavity, but very soon a seromucous fluid accummulates, which at first is clear, but shortly becomes more or less cloudy, due to the presence of polymorpho-leucocytes. According to the severity of the infection this mild degree of inflammation, the so-called catarrhal condition, may remain *statu quo* or gradually resolve and the mucous membrane assumes its normal appearance. However, in the large majority of cases the infection is sufficiently severe to produce a more decided reaction and the contents of the cavities rapidly become purulent. The histology of the mucous membrane in the more severe or purulent type is simply that

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manifest when tissues react to a severe infection. While in the milder type we may find a few scattered red blood cells in the connective tissue trauma, in the severer we find not only an increase in the congestion but also what appears to be numerous sub-epithelial hemorrhages, so that on examination of the tissues we find areas of which the histology is apparently blotted out by the extravasation of red blood cells. The red blood cells may at times pass through the epithelium even to the extent of giving the contents of the sinus a reddish hue. The mucous membrane is also more edematous and greatly thickened, and in some cases of maxillary sinusitis the whole cavity may be almost obliterated by the edematous membrane. In acute inflammations, the epithelium while frequently infiltrated with a large number of leucocytes seldom shows any great amount of desquamation. In the sub-epithelial connective tissue there is a noted increase in the white blood cells, but they are generally limited to the outer third of the connective tissue layer, while the deeper layers remain free. The leucocytes also seem to accumulate in the neighborhood of the glands. The glands themselves seem to be about normal in number and the alveoli lined with mucous secreting cells.

It is noted by Goetjes, in his study of the pathology of acute inflammation of the sphenoidal sinus that the cellular infiltration of the sub-epithelial connective tissue consists largely of lymphoid cells and there are comparatively few polymorphonuclear leucocytes to be found. Numerous eosinophile cells are frequent and a few plasma cells may be present. It should be noted that this infiltration is greatest just beneath the epithelium and only spreads into the deeper parts of the connective tisse layer by following the blood vessels. Goetjes has never noticed the excessive thickening of the mucosa of the sphenoidal sinus as has been described as occurring in the maxillary sinus, its thickness never reaching over one to two m.m. Even this degree of thickness is only seen in cases of acute suppurative inflammation.

In the large majority of acute infections of the accessory sinuses the bone is not involved and an explanation of this fact is found in the study of the pathology of this condition. While

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the whole membrane may be more or less edematous it is only the superficial layers that show leucocytic infiltration. However, in a small class of cases when the inflammation is very severe, as for instance in streptococcic infections, and especially is this true of scarlet fever, the whole membrane becomes infiltrated. Then the periosteum, which is anatomically continuous with the connective tissue of the mucosa must suffer, and we are apt to have bone inflammation.

It is not the purpose of this paper to go into chronic sinusitis nor to take up the discussion of the differentiation between the hyperplastic and chronic suppurative conditions. The changes found in the chronic inflammations are such as require time for their formation, and such time is generally not given in the infectious diseases. It might, however, be well to recall some of the characteristic changes of chronic sinusitis if only for the purpose of pathologic diagnosis. While the epithelium in acute disease seldom shows any great change, the desquamation of the superficial layer is a prominent feature of chronic inflammation. It is still a disputed question whether true metaplasia of the epithelium ever takes place within the accessory sinuses, that is, whether the cylindrical cells are ever replaced by true squamous cells. Polypi frequently occur in the ethmoidal cells and are occasionally seen in the antra and sphenoidal cells. Cysts of the mucosa apparently occur in two ways, either by the occlusion of the ducts of the deep mucous glands or by adhesion between the thickened folds of an hypertrophied mucosa. The connective tissue layer of the mucosa may become hyperplastic until the cavity is almost obliterated, and this may be followed by a sclerosis which fills the cavities with fibrous tissue. When the obliteration of the cavity has become complete there is cessation of discharge, and the condition should be regarded in the light of a spontaneous cure. Certainly it is the end result hoped for after many of our radical operations. In some cases after long continued suppuration there are inflammatory changes which cause increased activity leading to the formation of new bone tissue, and this formation takes part in the obliteration of the cavity. That an accessory sinus can be obliterated by bone formation

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has been shown by Ssamoylenko. His experimental work on the frontal sinuses of cats is very instructive. He removed the normal lining membrane of these cavities and in the course of six months was able to obtain complete bony occlusion.

Diphtheria—Diphtheria is more frequently complicated by involvement of the accessory sinuses than any other of the infectious diseases. Wolff made a post-mortem examination of (22) twenty-two cases of diphtheria and in every one of these he found some pathologic lesion in the maxillary sinuses. In fifteen of these the sphenoidal sinus was not developed, but in the remaining seven the sphenoidal cavities also showed the presence of disease. In an elaborate essay, Councilman, Mallory and Pearce report fifty-two (52) cases of diphtheria examined by post-mortem and thirty-three showed inflammatory changes in the accessory sinuses. It must be remembered however, that all of these cases were examined after death, and it is probable that the non-fatal cases will not show so frequent involvement, as the diminished resistence to bacterial invasion which must be present in the severe infections, especially just before death, makes the accessory sinuses much more susceptible to infection. The large majority of inflammations noted were not of a very severe type, and in practically none was there any distinct invasion of the bone. In only comparatively few cases was the disease of the accessory sinuses due to the diphtheria bacillus, and where the inflammation was mild and of the catarrhal type the diphtheria bacilli were scarcely ever found. Councilman, Mallory and Pearce found the specific organisms much more frequenty than did Wolff. The most frequent organisms present in these cases was the streptococcus and next to that the staphylococcus pyogenes aureus. Other organisms found were the staphylococcus pyogenes albus, the pneumococcus, the colon bacillus, the bacillus pyocyaneus and a variety of non-pathogenic organisms.

The accessory cavities in diphtheria frequently contain only clear mucous and the membrane in these cases show little change except congestion, and a slight edema with increase in the number of beaker cells. Again the contents may be mucopurulent or purulent, and the lining membrane show the

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changes of acute suppuration sinusitis there being hemorrhagic spots, marked edema and a greater degree of congestion. Again there may be a deposit of true diphtheritic membrane usually only partially covering the lining membrane. The diphtheria bacilli are sometimes found in the severe types of infection even when there is an absence of membranous deposit. An important consideration is the relation of the condition of the nasal cavities to the accessory sinus involvement. According to the statistics of Wolff it does not seem necessary to have a diphtheritic membrane in the nose to produce diphtheria of the accessory sinuses and also the nose may be almost occluded by membrane without the diphtheria organisms gaining access to the accessory sinuses. However, the per cent of involvement is greater when there is advanced disease in the nasal cavities. When the sphenoidal cavity is present, for some reason the diphtheria bacilli are more frequently found in this sinus than in the antrum of Highmore. It is probable that the ethmoidal cells will more frequently show the presence of diphtheria than the more secluded cavities, but the number and the small size of the cavities makes this difficult to demonstrate.

From the above findings it seems that the large majority of accessory sinus infections occurring in diphtheria are not due to the specific organisms, but rather to the ordinary pyogenic bacteria, though the diphtheria toxin by producing a lessened resistence, paves the way for such infection.

Scarlet Fever—The frequency of the involvement of the accessory sinuses in scarlet fever is somewhat difficult to ascertain, chiefly because the general systemic condition is of such severity as to make the minor local infections of really secondary importance. The temperature is already so high that a mild degree of infection in the nose does not materially alter the fever curve, and the general depression prevents the patient from complaining of local pain except when this pain is intense. The frequency of purulent conditions within the nose itself keeps the physician from attaching any importance to a purulent discharge. However, it is probable that the involvement of the accessory sinuses is not so frequent in scarlet fever as

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it is in diphtheria. Chausseria and Lapree believe that suppurative involvement of the sinuses is comparatively rare as they only found it once in their post-mortem examinations. This, however, does not correspond with statements of other observers. Numerous cases have been reported by Preysing, Ruedi, Killian, Wolff, Hubbard and others. Almost all of these cases were recognized only when there was evidence of bone necrosis. Ruedi, however, was able to see some of the cases in their earliest stages because he had the opportunity of making autopsy examinations shortly after the sinus involvement had begun. According to Ruedi, sinus involvement and certainly pan-sinusitis is indicative of a severe attack of scarlet fever. The sinus involvement of scarlet fever apparently always sooner or later becomes purulent, and is very apt to be followed by bone changes so much so that the chief pathological process characteristic of scarlet fever sinusitis is the rapid involvement of the bone. This is especially true in young children. We may, however, have a mild degree of infection of the sinuses, and this even when the nasal lesion is extremely severe. In the mild cases the mucosa of the sinuses is usually very much thickened, and there is an increase in the number of beaker cells in the epithelium, with more or less increase in the leucocytic infiltration of the sub-epithelial connective tissue. It is probable that a condition like this frequently exists and recovers spontaneously without being recognized. When the lesion is severe the membrane is greatly thickened, shows numerous hemorrhages, and more or less desquamation of the epithelium. Psuedo-membrane is as frequent in scarlet fever as it is in diphtheria. The bone changes are due to the fact that in scarlet fever the infection shows a distinct tendency to spread to the deeper layer of the connective tissue of the mucosa thus involving the periosteum. The bone may simply be inflamed and softened, and the bony capsule of the sinus only involved, or there may be actual necrosis and extension of the process into the medulla giving rise to an osteomyelitis. In some cases sequestra have been found. Preysing says that the most frequent sinuses to show necrosis in scarlet fever are the ethmoidal cells, and that rupture into

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the orbit frequently follows, leading to orbital abscess, and even destruction of the eye-ball. He recognizes two distinct pathological conditions that occur in the bone. First, a condition the result of the peculiar severe septic infection of scarlet fever manifesting itself in gangrene of the soft tissues, and followed by necrosis of the bone with formation of sequestra, and second, an ulcerative carious process somewhat similar to that seen in suppuration of the mastoid process. The perforation into the orbit may be either through the lamina papyracea or when the frontal sinus is present through the floor of that cavity. The orbital abscess may evacuate itself by rupturing externally with the formation of a chronic fistula which does not heal until the diseased bone has been removed.

Intra-cranial involvement more frequently follows disease of the frontal sinus than of the ethmoidal cells. This is probably due to the fact that the ethmoidal cells offer less resistance toward the nose than does either the frontal or sphenoidal cavities. The most frequent intra-cranial complications are meningitis and thrombosis of the longitudinal sinus. The method of infection is almost always through direct continuity of structure. The possibility of an infection being carried from the sinuses to within the cranial cavity by way of the lymphatics is impossible as the lymph vessels of the accessory sinuses drain in the nasal cavity, passing through the ostii of the various sinuses. Where we have an infection of the brain cavities through the lymphatics the organisms come from the nasal cavity itself and this is due to the fact that there is a direct lymphatic connection between the upper part of the nose and the cranial cavities. Zwillinger has demonstrated the existence of lymphatic vessels in the upper part of the nasal cavity which connect with the perimeningeal lymph spaces and are independent of the perineural lymphatics of the olfactory nerve.

Measles—According to the findings of Wolff, who examined five cases of measles after death, severe infection of the antrum of Highmore is more frequent even than after diphtheria. In his cases the infecting micro-organisms were the diplococcus lanceolatus and the staphylococci. There are no pathologic

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lesions in the accessory sinuses peculiar to measles, the conditions found being that of a severe edematous inflammation.

Other infectious diseases may give rise to accessory sinus disease, but the pathology of sinusitis following these diseases, shows nothing characteristic or peculiar. The frequency of influenza sinusitis is in part due to the prevalence of this disease, but the bacilli of influenza has a predilection for the respiratory mucous membranes, and therefore it is to be expected that even the more remote cavities connected with the upper respiratory tract, such as the ear and the accessory sinuses, should be frequently involved.

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SURGICAL CONSIDERATION.

BY C. G. COAKLEY, M.D.

1. The writer is convinced that inflammation of the nasal accessory sinuses occurs as frequently in children as it does in adults.

2. Owing to the imperfectly developed and consequently shallow cavities in early childhood, as compared with their subsequent development, when the sinuses are diseased, there is a greater tendency to spontaneous cure and consequently less necessity for any special treatment.

3. Very few children under five years of age and many even older can be satisfactorily examined either by anterior and posterior rhinoscopy or by radiography except when placed under a general anesthetic.

4. We have found transillumination in children under ten years of age to be valueless as a diagnostic aid. In children over ten and under fourteen years, it becomes valuable as the child's age increases, corresponding to the approach in development of the child's head to that of the adult.

5. We consider a child whose naso-pharynx is free from adenoids yet who has a long standing profuse, thick, yellowish, mucopurulent anterior nasal and post nasal discharge, as having a rhinitis accompanied by a sinusitis, unless we can find some other definite cause for the discharge. Most of these cases are cured or improved as a result of cleansing the nose, attention to diet and improving the general health. Moreover these cases show a very marked tendency to relapses or recurrences, similar to the exacerberation in the nasal discharge in chronic sinus disease in adults. One can after thoroughly douching the nose of a child, often use suction to advantage and aspirate secretion from some of the sinuses.

The proportion of cases of sinus disease in children that need any surgical aid whether by the intranasal or external route, is exceedingly small as compared with the similar disease in adults.

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If one diagnoses sinus disease in a child under six he can not expect to do much by intranasal treatment under local anesthetics, owing to the intractability of the patient and the small space within the naris in which to work. Repeated general anesthetics and intranasal operations may be tried, but I have not found them satisfactory.

When the child is over six we may expect to do a little more intranasally according to the age and temperament of the patient. We may divide the cases demanding surgical treatment into two classes, those characterized by a swelling over the antrum and those characterized by a swelling around the orbit.

Antral Cases.—The antral cases differ from the antral cases in adults in that there is almost always an osteomyelitis of the superior maxilla complicating the disease of the antrum. Intranasal opening into the antrum is not sufficient to effect a cure. An incision should be made under the lip parallel to and one-half centimeter above the teeth and the antrum opened and the carious bone freely curetted away. A counter-opening into the nose then made, and the mouth wound packed with guaze or not, according to the surgical condition found at the operation.

Considerable destruction of the teeth is likely to result, both as a result of the disease and the operative procedure.

Orbital Cases.—By orbital cases we mean those sinus cases which show more or less edema and redness beginning about the eyelids and extending at times up over the forehead or down on the cheek. We regard these cases as inflammation of the periosteum and soft tissue of the orbit from an extension of inflammation or actual infection of the orbital contents as a result of suppuration in the ethmoid cells, sphenoid or frontal sinus. The younger the child the greater the probability that the ethmoid and sphenoidal disease is the source of infection. Clinically we recognize two classes of orbital cases.

A—Mild Case.—Characterized by slight swelling of the lids, slight redness, temperature elevated only a degree or two,

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pulse rate slightly increased and in accordance with what it might be expected to be.

These cases should be watched most carefully for the onset of any unfavorable symptom and in the meantime be put to bed, the nasal mucous membrane contracted with frequent applications of a 1% solution of cocaine and a 1-20,000 solution of adrenalin, and cold compresses kept over the eye and adjacent region. Free catharsis with calomel followed by a saline must not be omitted.

This mild type frequently resolves without the necessity of any surgical intervention.

B—Severe Type.—By this type we mean cases in whom the eyelids are greatly swollen, a dusky shiny red and probably associated with exophthalmos, the edema extends to the forehead or cheek or both. The temperature is elevated several degrees and the pulse rate is *lower than the normal rate* of a healthy child of that age. I have seen a child five years old with orbital cellulitis a temperature of 104 F. and a pulse rate only 50.

Orbital cellulitis, with the above symptoms demands prompt surgical treatment by the external route. While a radiograph might help to determine the extent of the disease process, we feel that the delay in taking, developing and drying the plate might result in such further extension of the disease to the cranial contents as to lessen the chances of the patient's recovery.

The operation which I advocate is ethmoid and sphenoid exenteration via the external route.

The patient is etherized, anesthesia being maintained through a mouth tube. The naso-pharynx is plugged to prevent secretions getting into the larynx. The skin in the region of the orbit is sterilized and a curved incision begun one-half centimeter internal to and one-half centimeter below the supra-orbital notch. The knife is plunged down to the bone and carried in a curved direction inward and downward midway between the inner canthus and the bridge of the nose to the middle of the lower part of the nasal bone. The periosteum

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is elevated forward and backward and almost immediately one enters the broken down anterior ethmoidal cells filled with pus. The ethmoid and sphenoid cells are all opened with a curette and removed as in the latter part of a Killian operation. A probe can be passed into the frontal sinus. If it is larger than a hazel nut it will be found difficult to completely remove the diseased membrane, and a horizontal incision is to be made over the frontal and the first part of a Killian operation performed. Leaving any diseased membrane in a frontal sinus after an ethmoid exenteration, is the most probable cause of a recurrence of infection in the orbit some weeks after the original operation.

Any pus in the orbital fat should be evacuated by an incision and drained with a small cigarette drain. The entire operation should not occupy more than fifteen or twenty minutes. The wound should be left open and a large flat cigarette drain inserted to the bottom.

In about a week, or not until all orbital cellulitis has disappeared, the child should be given an anesthetic and the edges of the wound freshened and sutured to lessen the scar. The family may be assured that the scar of such an ethmoid exenteration will be a simple linear one, with no depression or deformity noticeable a year or two after the operation.

Discussion on Symposium.

Dr. Harris P. Mosher, Boston: It is hard to get data on the development and the size of the accessory sinuses in children. Very few bodies of children find their way into the dissecting room, and children make poor subjects for X-rays. Occasionally, however, we do get an X-ray, or have a chance to investigate the sinuses at autopsy. In such instances I have usually been surprised at finding the sinuses larger than I anticipated. This is especially true of the sphenoidal sinus. In one case, a boy of twelve, the sphenoid was of average adult dimensions. Most of us, therefore, have to go for our information to the men who have been fortunate enough to have material for making observations upon the sinuses in children. Onodi, who has published a book on the "Accessory Sinuses in Children" is our chief authority. Davis has recently written a valuable

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book. I have roughly traced some of Onodi's plates and grouped and charted his findings. They help to visualize his results. Also, I examined ten X-rays taken of children's heads, in cases where there was a question of fracture of the skull. These rough tracings are also submitted.

According to Onodi, less is accurately known about the maxillary sinus than about the others. Investigation seems to have focussed upon the frontal sinus and the ethmoid cells. The antrum appears in the fourth month of foetal life and at birth is a cul-de-sac, about the size and shape of half a coffee bean. Tooth buds take possession of the body of the superior maxilla and give the antrum but little room until the second dentition. At this time the antrum enlarges quickly. Another important observation in connection with the antrum in young children is that it is best approached from the nose through the middle meatus. There is but little space under the inferior turbinate and the wall of the antrum at this place is much thicker than in adult life.

The ethmoid cells are present at birth; there are two or three posterior cells and a like number of anterior cells. The posterior are the larger. A distinction which they retain throughout life. Their dimensions, height, length and width, are about, for the anterior cells, 2 mm., and for the posterior cells, 2, 5, 1 mm. The ethmoid cells increase rapidly in size, relatively much faster than the frontal sinus or the sphenoid. I had usually considered them of insignificant size; they are not, however, as at six years of age they are distinctly surgical, that is, they measure 11, 6, 6 mm. for the anterior group, and 10, 17, 9 mm. for the posterior. At thirteen years the ethmoidal labyrinth is of adult width and the cells nearly, if not actually, of adult size. An X-ray taken at this period is striking because the ethmoid labyrinth is wide and apparently fully developed, whereas the frontal sinuses in comparison are small.

There is no frontal sinus at birth, only a comma-like fossa at the summit of the unciform groove which by upward growth is to make the sinus. By the third year the frontal sinus is peeping above the level of the cribriform plate; the sixth year the height and width may measure 10 and 10 mm. The frontals grow very unequally. As far as size is concerned they are unreliable from youth to old age. Occasionally they are precocious. For instance, Onodi figures one case of an eight-and-a-half-year-old child in which an adult sinus was present (21, 29, 21 mm.). From ten to fourteen years it is common to find what might be classed as a small adult sinus.

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I have tracings of a sinus at ten years, and of one at fourteen years, which illustrate this.

The last accessory sinus is the sphenoid. At birth the sphenoidal sinus has a well formed ostium and a small cavity. The height, length and width are 4, 2, 2 mm. At three years there is a sizable cavity, 6, 6, 9 mm.; and at seven years and a half it measures a half-inch in its chief diameter (12, 13, 9 mm.). The frontal sinus at this time is far behind the sphenoidal in development.

The order in which the sinuses enlarge seems to be roughly as follows from birth to the third year the ethmoidal cells have the lead; then the sphenoid starts to enlarge actively; at the sixth year, or the period of second dentition, the antrum becomes active, takes the lead, and ever afterward holds it. From the sixth year also the frontal sinus, the laggard of the sinuses, increases rapidly.

The gist of the matter is, that from the third year there is an antrum large enough to permit of surgical treatment. The same is true of the ethmoid labyrinth from six years onward, and of the frontal from the eighth year. From the third year a surgical sphenoid may be expected. Precocious development of the sinuses, and there are numerous cases reported of surgical interference which show this, may make any or all of the sinuses of surgical size before the periods just mentioned.

Dr. Thomas Hubbard, Toledo: I would like to speak of three or four types of acute sinusitis in children which have come under my observation. First, a young child of six years of age with orbital abscess following measles; this case was seen some time after the initial attack and there was a sinus which had ruptured the orbit. The child was in good general condition, the parents refused operative interference, yet the child recovered. The second is one of the fulminating types of scarlet fever in a girl exposed to the cold after the initial symptoms of fever, and she very suddenly developed acute general sinusitis. In thirty-six hours there was coma, and death inside of three days. That was one of the cases which are inoperable at any stage. The third type is of scarlet fever of less virulent character in a boy of seven. The initial symptoms were otitis media; very prompt paracentesis; the next pharyngitis, and following that the rash and typical symptoms of scarlet fever. Although this child was in the best of hygienic surroundings, with the best of nursing, the ear went on to a suppurative mastoiditis, and a mastoid operation was necessitated about the third week. General sinusitis on both sides was developing, with gradually increasing severity; the symptoms were

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typical. The right sinuses seemed to reach a maximum of inflammatory disturbance, and then gradually improved. This gave me hopes that the sinuses of left side (the left ear was operated) would improve, but increasing systematic and local disturbances necessitated a radical operation upon the left sinuses about three weeks after the mastoid operation. A modified radical operation was done. The frontal sinus was involved only in its lower portion and consequently there was no opening made above the orbital ridge. Complete ethmoid exenteration. Probably the sphenoidal sinus was also opened, as was the maxillary antrum and all thoroughly cleaned out and free drainage established. Three or four days of marked improvement followed, then a relapse with a gradual rise of temperature. Autogenous vaccine made from the granulations taken from the ethmoidal cells was given, with exacerbation of temperature for about forty-eight hours, then marked improvement and gradual but complete recovery. The patient has been under observation for five years. Last Winter for the first time he developed symptoms of pus in maxillary antrum. It was necessary to wash out the antrum for a few days, and then it subsided.

Another case is of the subacute chronic type, in a child of six years, brought up on the floor of a basement. He had a succession of attacks of acute coryza during several Winters which finally resulted in a general suppurative sinusitis involving all the cells on both sides. This boy was treated according to the method suggested by Dr. Coffin. It was impossible to irrigate the antra more than about six times. After that it produced such a nervous shock that it had to be discontinued. Suction treatment was undertaken every other day (about three pounds negative pressure), to aspirate the pus. After each treatment he would be very comfortable for the day. There was more or less purulent bronchitis. Finally I was compelled to operate on account of the bad smelling pus, but his condition was so critical that I limited it to draining the maxillary antra into the nose. Within twelve hours after operation his temperature was 103.5 degrees, and he developed a bronchial pneumonia. He was very sick for a week. The antra have since remained comparatively clear, having good natural drainage. As soon as his condition warrants it, it will probably be necessary to perform a complete exenteration of the ethmoids.

The symposium has been ably presented by Drs. Coakley, Coffin and Wood, and it will stimulate a keener study of these cases in the future.

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Dr. Emil Mayer, New York City: There seems to be another class of cases of this affection in children between the two types as mentioned by Dr. Coakley, of moderate inflammation and infiltration of the orbit, and of the severest type, and I have recorded such an instance and found to my great surprise that in the literature all the other cases of a similar kind had the same train of symptoms. This child had a chronic disease of the ethmoid and maxillary antrum. All the patients were in the neighborhood of from three to five years of age, and all had the following conditions: An opening or perforation directly under the eye about half an inch, an ectropion, and foul smelling discharge. A probe dropped into the opening over the zygoma went into a cavity and turned toward the nose and was easily pushed into the nose. In my own case an external operation, consisting of linear excision, curetting and drainage through the nose, was followed by complete cure.

Dr. William E. Casselberry, Chicago: Strictly acute sinusitis in children, unless diphtheritic or scarlatinous, has been in most instances, under treatment similar to that which Dr. Coffin has described, recovered almost spontaneously, since the treatment, though helpful, seemed not essential. But the outlook is less favorable in acute exacerbations of a certain chronic type of sinusitis which requires, and in the older children is amenable to, a conservative intranasal operation to establish effective drainage It is the sort you see occasionally in older people, with pus-laden nasal polypi in the middle meatus, polypoid enlargement of the middle turbinates and pus in the antrum and posterior ethmoidal cells. These polypi are different from the usual type, being softer and marked by spots and streaks of pus within their substance, or again they may be so slightly organized as to be scarcely distinguishable from retained gelatinous mucopurulent secretion, as if the secretion itself were in process of organization into polyps. I caused some very soft globular specimens of this sort recently curetted from an antrum to be examined microscopically and in the report they were described as "showing islands of mucous cells enmeshed in fibrils," and classed as "soft myxo-blastoma." If simply snared away they rapidly return, within a week or less, and their place may be taken even in a day by thick, whitish, false membrane, parts of this exude itself seeming to organize into polyps. If removed, however, together with the better part of the middle turbinates and more or less of the anterior ethmoidal cells, they are less apt to return or do so more slowly and sparsely. This operation I have found feasible in a limited number of older children under cocaine anesthesia, but oc-

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casionally a general anesthetic is required. I recall one especially in which operation resulted in such a degree of recovery that for two years it has required no further operative treatment. This subject was impressed upon me by a child upon whom I did not attempt to operate in a way to provide effective drainage because of unusual timidity and frailty, one to whom even the simple removal of polyps was an ordeal seldom submitted to and who later succumbed to meningitis. There is always this menace, even in children, and I believe it to be our duty to lessen it by establishing effective drainage, which usually may be done by the intranasal route.

Dr. Robert C. Myles, New York City: My attention has for some time been directed to disease of the accessory sinuses in children. To differentiate between the operable and inoperable cases requires our best judgment, attention and concentration of thought. The fundamental principles of these chronic cases, in my opinion, are the securing of proper drainage, and resolves itself into a surgical mechanical proposition. I believe that we have been a little conservative in not teaching and advertising more frequently these intranasal operations on the ethmoid and antrum of Highmore, in children under puberty. It is astonishing how a child can be trained to allow you to operate under cocaine. I have used cocaine frequently by hypodermic method, and in this way it renders the operation quite painless if injection be made into the middle turbinal region. I believe we will be able to open the antrum more successfully by enlarging the hiatus semilunaris, securing drainage in that way, doing no permanent harm but effecting permanent drainage, and thus pave the way for the future irrigation if necessary.

In a case of mucocele, if one makes a permanent opening through the nose he will secure the best results. In cases of chronic suppuration, those preceding atrophic rhinitis, it has been my custom to find the drainage fairly good. I have used in conjunction with other treatment a powder of aristol and boric acid insufflating half a grain once a day into the nose, at night, and I do not know whether it is the iodine generated from the aristol or what it is, but it seems to me that the casual factor of suppurative rhinitis which terminates in atrophic rhinitis is sometimes completely arrested. In conjunction I use ichthyol as an ointment. In some cases with continued purulent discharge I rarely find any difficulty in making a diagnosis, but the difficulty is in entering the sinus, keeping it open, and allowing it to heal and the germs to die out. I want to compliment the writers of the papers, because I think in a few years, with the views they have given us as the results of

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their observations and through our own future experiments, we will gain much in the way of obtaining relief for this very frequent condition.

Dr. Hanau W. Loeb, St. Louis: It seems to me that there are two classes of cases to be considered, one of which has been very well presented, namely, the cases of active trouble in the sinuses. I will not call it acute because it may be chronic. In this, the indication for operation is clear, whether it be done externally or internally. It seems to me in this class of case we all know what to do, but the most unsatisfactory types are those in children in whom there is bilateral suppuration from the nasal cavities, which without definite proof seems to come largely from the accessory sinuses. The nostril is exceedingly small, so that it is almost impossible to get a satisfactory view, the nose being really a duct. and for that reason not sufficiently developed to take care of the situation.

I am glad to hear what Dr. Myles and Dr. Coffin do, because I cannot do anything for them myself, as they are not cured by adenoidectomy, etc. I am speaking particularly of cases of suppurative discharges coming from the accessory sinuses.

Dr. Virginius Dabney, Washington: I would first refer to a trinity of symptoms in the acute cases. First, there is the high temperature, frequently 104 degrees, often quite unassociated with influenza or bronchial trouble. This, I think, is particularly remarkable when we remember the cause is an open empyema. Second, with regard to the prolonged convalescence. I have under observation a case which has been irrigated six times a day for ten days with an immense amount of discharge. The case was not easily diagnosed; it was seen on the third day with an internist. but it was only by exclusion that we arrived at the diagnosis. Pressure on the canine fossa was painful, and pressure over the supraorbital ridge. There was high temperature and all the train of symptoms which are recorded as typical, after three weeks of apparent cure. Under irrigation in these cases the temperature comes down to 99 degrees for ten days or so, then there is an exacerbation from a reaccumulation of pus. This trinity of symptoms has occurred so constantly this past Winter in my cases in Washington, where we have an epidemic of influenza, that it has attracted my attention. I would cite one case of a boy who went wading two weeks ago in a public fountain; no bronchitis; temperature suddenly shot up to 104 degrees. The pediatrist said he had

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colitis. What he had was a pure infection of the antrum of Highmore, and has not yet cleared up under irrigation.

I agree with Dr. Coffin that if we can but impress on the internist that such things do exist we have done a great work.

Dr. John F. Barnhill, Indianapolis: What Dr. Coffin said regarding the pediatrist is undoubtedly true, yet I think he is not to blame so much as are we. We have not told him as much as we should. He will enjoy what has been said because it will help him. We are pediatrists to a certain extent, and it is through us that the greatest help must come. Another place where we should lend our aid is to the surgeon in the question of cerebral complications. I believe it is up to us to do more than we have done heretofore in enlightening the general practitioner and surgeon as to the exact cause and the number of cases that may arise from sinus disease. This is not so likely under thirteen as in the older patients, but an investigation of the floor of the cranial fossae will show in many cases that more than three-quarters of the anterior cerebral fossa directly overlies these sinuses, and that as much as one-half of the middle fossa directly overlies them; also if we consider the petrous portion of the temporal bone one continuous series of cells, which it is, nearly one-half of the posterior fossa is in immediate relation to these air spaces. If we attempt to find out how frequently meningitis results from disease of these sinuses we are greatly handicapped. We have not been able by consulting general surgical textbooks and medical literature to find any more mention of this than that it may occur. Mere mention of the acessory sinuses as a cause is all that is to be found in the latest and largest textbook on the brain, by Krause. We should make an accurate study of the relationship of these sinuses to the floor of the brain.

Dr. Coffin and others have spoken of the high temperature of some that had great increase in the pulse, and of others with lowered pulse rate. I have had an opportunity of seeing a number of cases in which there was lack of fever, pain or distress, the objective symptoms being great exophthalmos with swelling of the lid and discharge of pus into the nose. Recently I saw a child of thirteen in which there were no symptoms except this exophthalmos and a discharging fistula at the external angle of the eye. At operation I found the entire anterior and lower walls of the frontal sinus so much necrosed that both had to be completely removed. I am of the opinion that there is only one way to cure these cases, and that is by drainage. Heretofore we have been too cautious as to the manner of securing ample drainage. I believe that the gen-

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eral surgeon has always accused us of being half-hearted in our surgery. When it is clear that surgery is to be done where there is suppuration, there is, in my judgment, only one rational choice, and that is to secure ample drainage, either by internal, or, if necessary, by external operation. I am convinced that our internal surgery is not always sufficient. We should do it if we can, but always the external if we must, because we must get the drainage in order to cure the case.

Dr. Coakley spoke of doing a secondary operation, leaving an external drain in the cases operated on by the semi-Killian method. It seems to me that we should do this at one operation, by making the drain large enough into the nose.

Dr. Greenfield Sluder, St. Louis: I would like to cite one thing which has not been mentioned, particularly in regard to the posterior sinuses. It is relative to the text I read yesterday, and that is regarding the sphenoidal sinus, according to Dr. Davis' specimens which I had the privilege of examining. The sphenoidal sinus develops very early. The specimens showed that by the completion of the second year of life the extension of the sphenoid, although scanty in antero-posterior measurements, was as far as the foramen rotundum laterally, and at the sixth year it had reached the Vidian canal. Both the Vidian and the second division of the fifth nerves thus become closely associated with the wall of the sphenoid, and I believe this fact offers the explanation for the recurring headaches in children which are sometimes seen as early as the sixth year. I feel more convinced of this than I did last year, because of cases I have seen during the interval, and I have seen the sphenoid put out an eye and paralyze the third division, where the picture in a tractable child of ten years showed a polypoid swelling over the olfactory fissure, completely filling it, and bathed in pus from above. In the course of twenty-four hours that polyp disappeared under shrinkage, and the last vestige of pus with it. Under constant watching no further pus was found. In that particular case the second division of the fifth nerve and the Vidian nerve took part in the pain. The treatment was satisfactory, the third division came back into almost complete function, although there is still a difference of two diopters prism. That case lost its malignant type as soon as the shrinking took place. It was not operated upon.

I commend to all of you Dr. Davis' book on the accessory sinuses. It is certainly unique at the present time.

Dr. Harris P. Mosher, Boston: Among the sinus cases in children which have come to my attention there have been two similar to those spoken of by Dr. Mayer. In each there was a

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fistula under the eye which, when investigated, led to the antrum or nose.

Dr. Coakley's remark regarding the slow pulse in acute ethmoiditis interested me. This suggests some intra-cranial pressure. I would like to know if that is his explanation of the phenomenon in his case.

Dr. Ross Hall Skillern, Philadelphia (by invitation): There are one or two points brought out in the symposium which have struck me forcibly. In the first place, the small number of cases of sinusitis in children which we see and recognize. It is astonishing how few cases have really come under observation and been diagnosed as such. I do not mean the acute cases, which we see in conjunction with general acute infections, but veritable chronic sinusitis. In the pediatric department of the hospital with which I am connected there are a great many cases of children's diseases and very frequently the laryngological department is called upon to examine patients for nasal trouble. In the last year I do not recall more than one or two well marked cases of distinct sinus trouble which we have been able to diagnose with certainty. Whether this is due to the fact that in the sinuses of children the mucosa and the underlying bone are so intimately connected that when an infection occurs we do not seem to have the same condition as in the adult, but rather a general inflammation of the overlying structures, the cases being fulminating in type. In the operations we have done, mostly by the internal method, the underlying bone appeared to be softened and in the process of breaking down, showing a condition of infection of the entire wall of the nasal cavity on the affected side. I do think, however, that if we are more careful in our rhinological examinations we will be able to diagnose these cases earlier and do something more for them by preventing the disease from becoming so established as to necessitate an external operation.

I thoroughly agree with Dr. Myles that the internal method is the one of choice in these early cases. It is certainly very disagreeable to bring before the parents the fact that their child must be operated on externally. In some of these bad eye cases it is absolutely necessary to go into the ethmoid capsule by the external route, but in the majority of patients we should try the intranasal method first, i.e., the conservative method, because at the best we are working under very disadvantageous circumstances.

Dr. Lewis A. Coffin, New York (in closing): On general principles so much proof is here given of the statement that these diseases occur frequently, that it is very astonishing

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that the pediatrist does not recognize it. We could not pick up a book on children's diseases which did not treat of middle ear disease, mastoiditis, etc., and yet not one takes any account of the condition under discussion. It does, therefore, seem to be our duty to paint this condition red. In the throat department of the Manhattan Eye, Ear and Throat Hospital, we get as to children the cases that come in mostly on account of adenoids and tonsils. Occasionally we get the chronically catarrhal child. I have noticed in going through the hospital that the children's eye ward was filled with snotty nosed little patients suffering from phlyctenular conjunctivitis who never get to the throat department and are seldom seen by the rhinologist. I picked the children of this ward on whom to try out my method. I used an old-fashioned aspirating apparatus, replacing the needle with a medicine dropper in which a hole had been made at the top of the rubber. The vacuum produced, the perforated rubber is placed in one nostril, while the other nostri is closed by pressure on the alla, the crying of the child closes the nasopharynx, the negative pressure is turned on and immediately you see the glass part of the medicine dropper fill with muco-purulent material. This process is repeated twice daily and the child treated by auto-vaccination.

With regard to the type of case cited by Dr. Mayer, there is undoubtedly such a type. I know I differ from Dr. Mayer on this type of disease. If you read the different reports of cases—I believe Posey has reported two or three—you will find that it is pathognomonic of an osteomyelitis, proceeding from an involvement of the alveoli, and I believe in these cases the alveoli are always diseases. I do not doubt that a probe introduced through the opening under the eye may be made to enter the nose; very possibly the antrum is diseased also.

The next case of this kind that any one of us have, I would suggest that we make a very careful examination of the alveoli. I have done it and repeatedly found it diseased.

In regard to the size of the sphenoid there is a difference in Dr. Wood's and Dr. Mosher's statements. I have had some experience and believe that Dr. Mosher, who stated that the ostium was well developed with quite a cavity back of it at birth, is correct. I agree thoroughly also with everything that Dr. Coakley said except that I agree with Dr. Barnhill in regard to the closing of the wound. I do not see why, when these sinuses are thoroughly opened into the nose, as in the Killian operation, any harm can come from closing the external wound.

Dr. George B. Wood, Philadelphia (in closing): I would add just a word regarding the development of the sphenoid. There

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seems to be a great difference of opinion among the authorities I consulted. In my own experience I have never seen a sphenoidal cavity under one year of age which I could recognize. I have cut sphenoids in children six months of age without the slightest sign of a cavity. The majority of opinion, I think, would be that it becomes of surgical importance from four to six years of age, but may be recognized occasionally as a dimple on the anterior edge of the sphenoid body during the first year.

Dr. Cornelius G. Coakley, New York City (in closing): In the first place, with regard to the frontal sinus. In the radiography of children there is certainly a frontal sinus well above the orbital ridge in children three years of age. One explanation may be that these children with discharges and diseased frontal sinuses may have abnormal development of the sinuses, hence the disease.

As regards the instruments for intranasal work referred to by Dr. Coffin, I would state that Pfau is now making instruments identical with those for the adult, intermediate in size between the adult size and the small ear forceps. I have used in intranasal work an aural speculum of medium size, and these forceps go through such a speculum and are long enough to reach any part of the sphenoid.

As to the size of the sphenoid, I had occasion to operate on a child about a year and a half old with orbital cellulitis, and there was a sphenoidal cavity the size of a hazel-nut. The child died of laryngeal diphtheria three weeks later and we proved the size of this sphenoid at autopsy. Infection is claimed to come more frequently from the frontal sinus, but in the clinic cases I have seen, it has come oftener through an orbital cellulitis. The frontal sinus has not been involved particularly, and I think that an orbital cellulitis secondary to sinus disease is a condition which is very liable to extend into and infect the cranial contents.

With regard to the low pulse I would say that in two cases I have examined the spinal fluid and there has been no infection, and in 24 hours after, through opening of the abscess, the pulse has come up and run very high, showing that the slowness of the previous rate was probably due to compression. The bone in all these cases has been of peculiar leathery consistency, requiring a forceps to get it out.

I can agree entirely with Dr. Coffin in his explanation of Dr. Mayer's case. Such are due either to necrosis of the superior maxilla or ethmoid which has ruptured spontaneously, and such cases go to the ophthalmologist. Many of these cases

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are then referred by them to the rhinologist. These cases, so far as I have been able to determine, have usually ben streptococcic. The reason I leave the wound open is because I would do so with a streptococcic infection in the mastoid, and I believe in the type of cases I am speaking of—tense, shiny, hard induration of the orbit—if the wound were closed we are in danger of keeping up the cellulitis and producing an extension into the cranial cavity. You frequently get no more scar following drainage, although it may be wider and redder for the first four or five months, yet at the end of the year one cannot tell whether it has been closed primarily or healed by secondary closure. I got this idea of leaving the wound open in such cases from Killian.

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THE CORRELATED ACTION OF THE PHARYNX AND SOFT PALATE AND ITS EFFECTS UPON POST-NASAL DIAGNOSIS.

BY GREENFIELD SLUDER, M.D.,

By correlated action of the pharynx and soft palate must be understood the resultant action or effect of both the parts acting at once.

This district is complex anatomically, and serves in several functions, namely, swallowing, gagging, vomiting, sneezing, sucking, coughing, snoring, breathing, speaking, and singing, each of which is complex physiologically. My concern here is with the naso and oropharynges, and the functions of empty swallowing and gagging.

The simplest conception of the district, it seems to me, is that it resembles a soft walled tube, wanting in large part in front where the soft palate acting as a flat valve divides it into a nasopharynx above and an oropharynx below. The upper outlet is fixed bone and divided into the choanae by the septum nasi. The deficiency below is the posterior outlet of the mouth. The action of the tube in swallowing is a vermicular contraction from above downward, the anterior lower deficiency being closed by the tongue, which moves backward and upward, while the palate closes off the upper part. In ordinary swallowing a gentle degree of muscular contraction is used. In gagging the vermicular action is from below upward with the strongest contraction.

In or upon the posterior wall (pronounced in children) above the soft palate, is placed the pharyngeal tonsil increasing in front to back measurement from below upward, its uppermost part a free surface, somewhat shelf like, almost touching the basilar process of the occiput; or it is a little further removed from it according to the degree of swelling or shrinking which has gone on in it. Laterally, below the soft palate, are placed the faucial tonsils varying in size and degree of imbedding. They are nearly always limited below by their junction

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with the lymphoid tissue at the lower lateral aspect of the tongue, which is a rather constant point. Their limitations above are less constant.

Two types of tonsils may be recognized—one placed free ("unattached" or "nonadherent") between the pillars of the fauces; the other placed deeply (imbedded) between them, little if any of its substance protruding "free" into the pharynx. According to the degree of enlargement of the organ either of these types may rise into the mobile palate, even to meeting in the median line, compressing the uvula between them or crowding it forward and upward. When this is true, the upper lateral limit of the tonsil mass rises often to the junction of the upper and middle thirds of the palate; but this is less apt to be true for the free tonsil than for the imbedded one. The large "free" tonsil may lie under the palate arch in equal volume, but will push up the arch itself rather than ascend within it which makes it (the arch) look higher, if not stand actually higher.

Just above the palate and slightly posterior to the middle line of the tonsil is found the cartilaginous mouth of the Eustachian tube, which varies in size, prominence and position; being small and flat, or large and protruding one-half to one centimetre into the pharynx; or rising as high as the middle turbinate. Posterior to the mouth of the tube is the recessus pharyngeus (fossa of Rosenmueller), which may be scarcely at all marked or may be one and a half centimetres deep and one centimetre wide, extending outward and backward.

The free margin of the vomer begins below at the posterior limit of the hard palate and may rise straight up or pass upward and backward at an angle of 45 degrees. The angle of the choanal plane is determined by this angle. Its vertical measurement varies from one and one-half centimetres to three and one-half centimetres approximately.

The plica septi varies in size and position, extending slightly beyond the free margin of the vomer; or is placed well forward of this and sometimes higher or lower.

The soft palate is rather constant in length from its junction with the hard palate to its lower margin, but varies from two

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millimetres to one centimetre in thickness. The uvula and tongue vary greatly in size, and may play a part in correlated action.

The dimensions of the pharynx at the level of the palate may be five centimetres laterally, by two and one-half centimetres anteroposteriorly, which is the largest pharynx I have seen. Luschka (Anatomy des Schlundkopf, 1873), gives those measurements as normal. From my observations the average measurement in what seem normal adults in life is only about one-half of that size, and it seems to me that those measurements may be further reduced by one-fifth in what must often be admitted as normal. Such, however, must be considered a "small normal" pharynx. It may be narrowed to obliteration, by enlargement of the structures found in it. The circular measurement of this plane may be greatly lessened, without the soft palate being shortened as it might be, were the simple requirements of the flap valve followed. It seems its length is determined by something else than its functional needs. Its elasticity may vary.

I have thought it of interest to know, for clinical use, what happens in the nasopharynx during the acts of empty swallowing and gagging, and to this end have conducted in a desultory fashion a number of experiments extending over thirteen years' time. No way was known to me by which these functions could be observed directly, and even now with the help of Holmes, nasopharyngoscope and the X-ray it still seems impossible. The X-ray of a bismuth bolus being swallowed shows its upward and backward, or its directly backward course after passing the hard palate; but otherwise does not help. Einthoven* has given an extensive bibliography of writings on the physiology of the pharynx. But the particular type and purpose of the observations now to be described I fail to find recorded.

For my purposes I have tried many pigments to see if one could be found that would mark the surface wherever it touched, when placed on the upper surface of the soft

* Hymann's der Laryngo. u. Rhinol., Vol. II.

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palate in liquid form, one or two drops in volume. Two qualities were necessary in it, namely, that it should adhere readily to the membrane, and contrast sharply with it. These were found in a mixture of bismuth subcarbonate or hydroxide. Nitrate of bismuth is dissolved in dilute nitric acid and mannite (about 2 per cent) added. To this is added a solution of carbonate or hydroxide of soda to neutralization. The precipitate is washed free of salts and allowed to settle, or centrifuged to the thickness of buttermilk. It is opaque white, contrasts sharply with the red of the membrane, and adherent to it under all conditions sufficiently to permit of any desired observation. Liquid India ink* may be used as a black pigment. A drop or two of the liquid is introduced through one nostril by means of a small calibre canula and syringe, to arrive at the upper surface of the soft palate at a point in the center line of the choanal outlet. In a normal adult pharynx it is, upon swallowing, found spread over its posterior wall as high as the lower margin of the Eustachian tube, usually equally on each side. The mouth of the pharyngeal bursa is below this level. In this way I have seen pus, secreted by the antrum of Highmore in small amount, come into the nasal fossa in some way that eluded detection, reach the soft palate from the floor of the nose, and be habitually absent from the nasal fossa, to appear spread over the mouth of the pharyngeal bursa simulating Thornwald's disease.† The soft palate acted as a trowel and spread the pus there, as a mason spreads his mortar with his trowel. Inasmuch as no pus could be found in the nose this deception was complete for some time. In this throat, gagging would have spread the pus in the same general way a little higher up. This effect, however, may be *reversed.* Instead of the pus being spread from the floor of the nose and soft palate, upward and backward, it may enter the nose from behind and above, and be wiped off the posterior pharyngeal wall to appear only upon the upper back part of

* Draughtsman's India ink is sold in the American markets in liquid form.

† Uber d. Bedeutung d. Bursa Pharyngea. v. G. L. Thornwaldt, Wiesbaden, 1885.

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the palate. Its origin then may be difficult to trace. In order that this may happen the throat must be narrow in antero-posterior measurement regardless of what may be its lateral dimension.

Should the tonsils be small or absent, the loss of their pushing upward effect results in a lesser ascent of the palate. For the highest trowel effect in the nasopharynx the presence of the tonsils, to a greater or lesser extent, is necessary. The mouths of the tubes may or may not assist in this by the coming forward of the posterior wall of the pharynx to meet them, thereby obliterating the recessus pharyngeus. In a pharynx with small tonsils and small tube mouths, a drop or two of the bismuth mixture introduced to descend over the lateral aspect of the end of the lower turbinate will, in swallowing, be found spread on the lateral half of the posterior pharyngeal wall of that side at about the level of the lower part of the mouth of the tube. In the production of this picture the tube's mouth is set in the normal position; that is, there is approximately one-half centimetre free space between the tip of the turbinate and the cartilage of the tube; with like space betwen the floor of the nose and the cartilage, and like space in the recessus. The tonsils must be normal. Should they be large and rise high the pigment will be spread to a higher level, as they, also, are carried up in the rise of the palate and are assisted in this by the base of the tongue.

In gagging, the contraction of the constrictors may be so strong that in a smaller throat the posterior wall of the pharynx is brought forward to the limit of the hard palate and the lateral walls approximated. At the same time the soft palate is forcibly elevated to a considerable degree above the level of the hard palate, sometimes dimpling one centimetre above it. It should be recalled that the thickness of the soft palate is an average of about one-half centimetre, and frequently twice that; so this must be added in estimating, from below, the ascent of its upper surface. When the lateral walls are approximated and the posterior wall brought forward, and the palate is, as it were, stuffed upward into this narrowing gap, as happens in gagging, it is found that in the small normal throat the naso-

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pharyngeal space is annihilated, as may be shown when a drop of bismuth mixture is placed near the center of the upper surface of the soft palate and gagging induced. The resultant picture shows the pigment to have been spread by a general approximation of the surfaces, that is to be generally distributed, including an application to the free margin of the vomer. The angle of the choanal plane will play a part in this. This effect cannot happen in a large normal pharynx, or one of small normal calibre, but of unusual height with a vertical choanal plane; for the tucking up of the palate is a necessary part and it cannot be tucked up beyond its own length. The parts of such pharynges cannot all be approximated, but with their diminution in size it becomes more and more easy, until it comes to pass in a small pharynx with normal swallowing. In this way I have seen seropus spread by the palate from the center of the floor of the choanal outlet, backward and upward, and lose all index to its origin. I have also in this way seen small amounts of seropus, entering the nasopharynx from above, wiped away and so spread out as to elude recognition. And I have often seen a sphenoidal discharge, profuse and purulent, wiped off the posterior wall, leaving no index to its origin, adhere to the palate, and be raised over the tube into the middle meatus. At other times I have seen a small streak of thin pus, descending on the free margin of the vomer, wiped away by the palate and elude further recognition.

In considering diminution of size in the pharynx I feel that the means by which this may happen should be noted. A small pharynx may be part of a general diminutive state, *e. g.*, childhood; or the older pharynx may be encroached upon in several ways. The pharyngeal tonsil may exist in greater or lesser bulk narrowing its upper part from behind forward. The faucial tonsils may be enlarged narrowing it laterally. I suggest observation of the imbedded type, which may be large and not protrude beyond the surface. They are sunk into the walls and become evident only in gagging. I believe this type to be more potent in producing these effects than the prominent free one. It seems with the help of the tongue more efficacious in crowding the palate upward and backward. In gagging, the

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tonsil masses are carried markedly upward in the strong upward pull of the palate, while the posterior wall comes forward.

The mouth of the tube—in usual position and environed by normal turbintes, permits pus, flowing backward out of the middle meatus, to descend over the lower turbinate between its tip and the mouth of the tube. The act of swallowing will then spread the pus or pigment on the same side of the posterior wall to about the level of the lower limit of the mouth of the tube or a little higher. In gagging, under these conditions, the pus or pigment may be transferred from the lowermost lateral point of the choana of one side to the uppermost lateral point of the opposite side, namely, the lower part of the spheno-ethmoidal recess. This happens probably only when the contraction is strong in the obliteration of the last of the already narrowed space, after the palate has been forcibly elevated in a pharynx that is certainly not taller than normal (rather shorter).

The tube may be placed downward and forward of its usual position. Pus then proceeing backward from the middle meatus may pass over the tube backward and downward by way of the recessus pharyngeus. This is made easier by swelling of the posterior tip. In this instance the narrowing of the naso-pharynx in swallowing, combined with ascent of the palate, may in propitious throats convert the recessus into a tube, which will have its vermicular movement from below upward. In this way pigment may be transferred from the floor or middle meatus of one side to the upper meatus of the same side, and this holds true for pus also. It may also happen that pigment or pus descending in the recessus from above is at times stuffed into the middle or lower meatus provided it be caught in the right way to reverse this effect. Many times I have seen sero-pus, entering the recessus from above, by the act of swallowing, wiped away or so spread out as to elude recognition. I have sometimes seen, in gaging, pus from one olfactory fissure smeared over in such a way as to simulate suppuration of the opposite fissure also.

But in the production of these phenomena there seems to be

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little or no constancy. Sometimes the pigment will adhere more to the anterior parts, and at other times more posteriorly. This irregularity seems true oftener for pigment than pus. Possibly a difference in the moisture of the parts at different times determines this. Bismuth may be used to produce one picture and then India ink, at another or the same point. In this way two experiments may be done in a throat at the same sitting.

Observation upon the suppurations leads me to believe that their pictures in the pharynx may vary, that is, be different one time from that which appears at another time under similar conditions in the same throat. And furthermore that these pictures are not the result of a single act of swallowing. They are not so easily or readily produced as to result from a single act. It seems to me that pus is less easily transferred than bismuth and that many of the pictures we find are the results of a small volume of secretion and repeated swallowing, that is, that a small amount of secretion is each time put into its unnatural position, and that the picture we see is the accumulated result of many acts of swallowing. Should the patient gag repeatedly in process of examination, these phenomena may be thereby likewise produced. Observation on the cadaver as well as on the living has shown me, moreover, that pus may enter the pharynx from different parts of the nose and not appear at the sinus outlet where it enters. Thin secretion may descend from the sphenoid sinus on the septum nasi anterior to the plica septi and not be recognizable by any of our present modes of investigation. It reaches the soft palate, below, and is then spread by its trowel action in such a thin film on the posterior wall that it is with difficulty, or impossibly recognizable. The plica septi shuts it off from recognition by the postnasal mirror, and it cannot be recognized by the pharyngoscope. The anteroposterior dis tance between the osteum sphenoidale and the choanal plane varies much in different skulls. This explains how the last mentioned phenomenon may be a fact in some patients, but not in all. The position of the osteum sphenoidale may some-

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times be close to the median line, at other times placed far laterally.

A most elusive discharge is that which descends on the free margin of the vomer posterior to the plica septi and is wiped off by the palate in swallowing.

The effects produced by a large tonsil on one side or a large posterior hypertrophy of one side may be calculated, after one has done some of these experiments.

Resume.—To me it has been surprising to see the degree of narrowing (obliteration) that may take place in the nasopharynx in swallowing and gagging. This seems to have its limitations, however, in the soft parts. The elasticity of the tissues reaches a certain limit only. Therefore when the distance between the posterior limit of the hard palate and the vertebral column is great—2½ cm., and the lateral measurement 5 cm.—the combined narrowing effects are insufficient to obliterate such a large cavity in even the strongest gagging. The soft palate is not long enough to rise beyond the level of the tubes, and the loose tissue beneath the constrictors is insufficient to permit enough movement toward the center to result in approximation (obliteration).

But the degree of elasticity in the soft parts is practically constant. Therefore when the nasopharynx is small either because of scant space in the bony skeleton or because of the size of the structures developed upon or within its walls, approximation of its surfaces (obliteration) is possible by the easy play of the muscles in swallowing or gagging. Naturally the smaller the pharynx the easier may it happen. In a cavity a little smaller than the normal, this would happen only upon strong gagging and the pigment or pus would have to be in fair volume in order to be spread out; whereas in a small cavity a small amount of pigment or pus is spread out far, because the closing pressure is enough to spread a small amount over a wide area. This becomes easier, until, in the small pharynx which one often sees in adults, not to speak of children, it may happen in tranquil, empty swallowing. The quality of the pus also makes a difference. Thick mucopus

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holds together and does not transfer readily, whereas seropus spreads easier.

Clinically, the understanding of these phenomena is of value —I believe especially so—when some other facts are borne in mind. In considering the transferrence of secretion from one place to another, thereby giving rise to clinical deceptions, it should be recalled that it requires a fluid secretion to permit of this, and that then it is easily done, and that the drier the district and the thicker and more tenacious the secretion the less likely is it to happen. Under the last conditions I have repeatedly tried, in vain, to bring it about. But of *greater* value, it seems to me, is to know the fact that by virtue of the power of the small pharynx to approximate its walls it possesses the power to wipe away small amounts of thin secretion from any point of the choanal plane and even points forward of this (as may be shown by the bismuth being often put well into the meatuses). It is then so spread out over the general surface that it is lost from detection, and this may happen in the small pharynx in simple swallowing.

Practical Application of These Observations. — Every rhinologist is familiar with the difficulties that attend the examination of some patients. Despite careful approach, every attempt to see the nasopharynx is followed by gagging, and even a palate hook in a small pharynx does not prevent obliteration of the fault—the posterior wall coming forward. When it is recalled that this simple act may create deceptions in any one of the above enumerated ways, their practical value is self-evident, and when one remembers that in small throats these effects can be produced not only by gagging but by common swallowing, it becomes at once evident that there may be certain nasal disorders requiring diagnosis from the pharynx that may elude recognition indefinitely, *i. e.*, sphenoidal (and post-ethmoidal) discharge of thin consistency descending on the posterior margin of the vomer, or anterior to the plica septi, or in the recessus or near the median line. Such discharge often cannot be seen from in front, including use of Holmes' nasopharyngoscope; so that when it eludes the sur-

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geon from the pharynx, the deception is complete, and I believe may elude him indefinitely. Thin secretion from the sphenoid looks like thin cow's milk. For experimental reproduction of sphenoidal suppuration of thin consistency I have used thin milk or thin bismuth. It is very easily visible at the time of its instillation, but the last trace rapidly disappears from sight in the nose, and from a pharynx that wipes itself in swallowing. I have seen it lost in three minutes and leave no evidence to the patient's sensation—that is, not be recognized as having flown into the pharynx.

In a recent paper dealing with obscure headaches, I emphasized the fact that sphenoidal inflammation could lose the classical picture, namely, the easy showing of pus at the proper point, and continue indefinitely, making headache, but eluding recognition locally.* This happens because the secretion gets thinner. The above observations bear directly on such cases. Shrewd observers have emphasized the difficulties besetting sphenoidal diagnosis—conspicuous and familiar to all of us is Dr. Casselberry's paper before this association, 1911.

When one bears the possibilities in mind, or better still, will try the various nasopharynges experimentally, he soon learns to estimate—and I believe with reasonable accuracy—the possibilities or probabilities of the individual one at the time of examination, and thereby may avoid some deceptions in the diagnosis.

In concluding, I desire to reiterate and emphasize *that these effects can only very rarely be brought about in what I have defined as the normal adult pharynx with the exception of a simulation of Thornwald's disease, where the trowel action of the soft palate can do this. Very rarely the soft parts may possess unusual elasticity or freedom of motion. Such conditions may make it possible for the normal adult pharynx to approximate its walls not only in gagging but even in swallowing. Alterations in the form and size of the pharynx make the various deceptions possible as herein enumerated. The*

* Some Anatomical and Clinical Relations of the Sphenoid Sinuses to the Cavernous Sinuses and the 3d, 4th, 5th, 6th, and Vidian Nerves. (Archiv. f. Laryngol., B. 27 u. 28.)

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pictures are produced with surprising clearness by bismuth or India ink and much less so by pus. It is, of course, self-evident that pus at the classical sites, well forward of the choanal plane, with or without a clean pharynx, is of conclusive diagnostic value, and is uninfluenced by any of the above enumerated possibilities; but he who must needs have these classical pictures clear, before he can make the diagnosis, will have been eluded by other positive cases.

I believe, in a case where the history of nose disease is reasonably clear and the diagnosis very difficult, that it is at times distinctly helpful to know to what extent that nasopharynx is obliterated in swallowing and gagging. This would seem evident from the above context, and may be learned readily by the bismuth experiment.

The deceptions besetting postnasal diagnosis of the suppurations in children are largely, if not wholly, explained by these observations.

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THE SIMULATION OF PARANASAL SUPPURATIONS FOR TEACHING PURPOSES.

BY GREENFIELD SLUDER, M.D.,

Mr. President, I present to you a scheme for simulating the various suppurations of the accessory sinuses of the nose. So far as I am aware, such a one has not heretofore been used for teaching purposes. I summit to you the human adult cranium, which has been decalcified in 10 per cent HCL (to facilitate dissection), the calvarium removed, the accessory sinuses opened by dissection from its cranial aspect (which in the decalcified specimen is easily done), and the lower jaw and tongue removed for reasons which will appear later. The specimen may not have been decalcified or may not have been hardened in alcohol or formaldehyde, according to your whim. It is then stained red in an effort to reproduce the color of the living tissues. This particular one was hardened in formaldehyde and stained in ammoniacal solution of carmine, which I believe to be the best stain. Its subsequent preservation has been in a 5 per cent aqueous solution of benzoate of soda, which seems neither to soften nor harden the specimen that has once been thoroughly hardened by alcohol or formaldehyde. Should sodium benzoate be used as the primary preservative, it must be much stronger than 5 per cent solution and even then does not answer the purpose at all well because it does not harden it; but as a preservative for hardened macroscopic specimens it seems ideal, inasmuch as they do not mould or change by decomposition and may be handled in bare hands without corrosive effect on the skin. The jars should be kept covered. Uncovered jars develop a white mould should the solution be too weak. It does not, however, seem to injure the specimens. In warm temperatures this solution may slowly soften specimens that were not thoroughly hardened. Should this happen the specimen may be rehardened by a little formaldehyde. It is then washed and re-immersed in benzoate solution.

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The simulation of pus, a sample of which I submit for your observation, is the subcarbonate or hydroxide of bismuth held in suspension by the presence of mannite, an hexatomic alcohol. Nitrate of bismuth is dissolved in dilute nitric acid and about 2 per cent mannite added. Sodium carbonate or hydroxide solution is added to neutralization. The precipitate is washed and allowed to settle or is centrifuged, to the thickness of buttermilk. I have stained it by the addition of a slight amount of aniline yellow and methylene-blue. This preparation may be diluted with distilled water to reproduce the seropurulent discharges or may be centrifuged to reproduce the thicker purulent discharges. A drop of it is then introduced into a sinus which has been dissected open from its cranial aspect. It may be put into the sinus to overflowing or into the normal outlet of the one that the experimenter may wish to demonstrate. The specimen is then observed as though it were the head of a patient in the erect posture, by means of head reflector, nasal speculum and post nasal mirror. The tongue and lower jaw being removed makes this by far the easiest type for demonstration. Should the demonstrator desire to simulate in further verisimilitude, reproducing some of the difficulties that beset the examination of the living, the lower jaw and tongue may be left upon the specimen, the mouth pried open by a gag, and a tongue depressor put into service. The specimen is observed for the entrance of the drop which has been introduced from above. One may see it appear for the waiting, and my experience is that the simulation of the clinical picture hereby produced is so true to life as to be astounding, and all the subtle variations may be reproduced by quantity of the "pus" mixture introduced, or its dilution. (Should the bismuth mixture dry in position during the course of the demonstration, it may be dissolved by immersion in 10% HCl; or it may be left in its position as a permanent demonstration.)

This sterile and permanent preparation stained to simulate pus may be utilized upon the living in the clinic for more advanced students by the simple introduction of a drop or two through a slender cannula at the various points at which appear clinically the sinus suppurations.

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Discussion.

Dr. Cornelius G. Coakley, New York City: I think this is one of the most valuable contributions to the aid in diagnosis of sinus disease we have had in a long while. Dr. Sluder has done a great service in proving that the secretions found in the nasopharynx are often the result of secretions coming from the nose and plastered there by the action of the soft palate.

Dr. B. Alexander Randall, Philadelphia: In my thesis here some years ago about the rather overlooked action of the upper edge of the superior constrictor which forms the so-called cushion, "Pasavant's," I dealt a little with some of these points, and I think we have to thank Dr. Sluder for having made possibilities in the matter more interesting and clear. We should bear in mind the extreme shelf-like character of that upper edge of the muscle and take note how the soft palate may go entirely above it and show a deep cavity underlying the vault, and this will go to show why from below in many cases the palate can reach clear to the vault.

Dr. John F. Barnhill, Indianapolis: This has been a very practical sort of paper. For a long time I have doubted any such thing as Thornwaldt's disease, and have believed that pus didn't form in this normal pocket because of adhesions closing its mouth. I have yet ever to see such an occurrence and I have regarded the presence of pus in this region as absolute evidence of either postethmoidal or sphenoidal disease.

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THE INFLUENCE OF THE NOSE ON EYE AFFECTIONS AS EVIDENCED BY A CASE OF BILATERAL BLINDNESS AND ONE OF UNILATERAL SCINTILLATING SCOTOMA CURED BY OPERATIONS ON THE ETHMOID CELLS.

BY H. W. LOEB, M.D.

Although many reports have been made showing the influence of the accessory cavities of the nose in the production of serious ocular disturbance we are still in the dark as to the manner by which the condition results.

Furthermore, we do not know why it is that the affection occurs in one instance, when in what appears to the observer an identical or similar condition, nothing of such a nature takes place. We have already been made familiar with those cases of extensive caries of the body of the sphenoid, and of the lateral mass of the ethmoid without the slightest disturbance of ocular function. And yet there are other cases in which the accessory cavities are only slightly affected, while the accompanying condition of the eye, be it causal or coincident, is extremely grave.

The studies in the anatomy of the region made during the past few years have fairly well established the anatomic relations. The pathologic side, however, is still far from satisfactory by reason of the infrequency of autopsies in these cases and the length of time which usually intervenes between the appearance of the symptoms and the performance of the autopsy.

The clinical side has been greatly increased by the numerous accessions to the record of the reported cases. To this record, I desire to add two, one of blindness and one of scintillating scotoma, both cured by operation on the ethmoid cells.

Case 1. Bilateral blindness, acute ethmoiditis, entirely relieved by the exenteration of the ethmoid cells.

S. P. C., aet, 16, unusually large and well developed for his age, was referred to me by Drs. M. H. Post, M. A. Bliss and J. F. Harrison, August 1, 1912. During the previous five

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weeks he had suffered from great loss of sleep, intense headache, the pain being localized over the supraorbital region on both sides. He began to notice reduction in his vision three weeks before. This increased day by day until, when I saw him, he was almost blind. A few days before he had a severe bleeding from his nose, resulting from a fall due to his decreased vision. The patient did not complain of any dizziness, though there had been some nausea but no vomiting.

Examination revealed extreme sensitiveness in the region of the inner canthus, above and below. Both inferior turbinates were of usual size, no swelling being manifest. The septum was quite straight, no ridges or deviations being present. Both middle turbinates were greatly swollen, but no pus was at first discoverable. Upon thoroughly cocainizing the middle turbinate area, a thin streak of pus was found coming from the region of the orifice of the posterior ethmoid cells on both sides.

In view of the history and findings, I gave the opinion that his condition was due to an acute ethmoditis, which so far as I could then ascertain was suppurative in character. A radiograph showed the region of both ethmoid labyrinths obscured, frontal sinuses small but clear, and no evidence of trouble in the maxillary sinuses.

Ophthalmoscopic examination at this time by Dr. Post and Dr. Shahan showed vision 1-192 O.D.; 3-120 O.S.; swelling of the disc plus 4 D., O.D.; plus 6 D., O.S.

I removed a large portion of the middle turbinates and cleared out the anterior and posterior ethmoid cells on both sides, and found the mucosa over the turbinates and within the cells considerably thickened. One cell wall was completely filled with the thickened mucosa which partook of the nature of a granulation. A very small amount of pus was encountered during the operation. The whole appearance was that of a recent marked ethmoiditis just becoming purulent in character.

The patient began to improve immediately. He was practically blind before the operation, and within twelve hours afterward he could recognize the large monogram on the

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hospital spoons. He left the hospital in one week with his vision almost completely restored.

Examination by Drs. Post and Shahan showed progressive improvement as follows:

	Vision. O.D.	O.S.	
Aug. 1st	1-192	3-120	Admission
Aug. 3rd	3-75	3-12	after operation.
Aug. 4th	10-38	10-19	
Aug. 5th	10-24	10-19	
Aug. 6th	10-15	10-15	
Aug. 8th	20-24	20-24	
Aug. 29th	20-12	20-19	
Sept. 18th	20-15	20-15	
Dec. 14th	20-12	20-12	

The swelling of the disc as ascertained by both Dr. Post and Dr. Shahan showed progressive recession, from O.D. 4D., O.S. 6D. on August 1, to O.D. ID., O.S., ID. on August 29.

Since this time he has had no further trouble with vision or headache. It seems to me that we have in this case a condition analagous to that of edema glottidis, supervening upon an adjacent grave infection as, for instance, in deep suppurations of the mouth and pharynx. In these cases as soon as the focus is relieved the edema rapidly disappears. Here, too, the condition rapidly improved, when presumably the infecting tissues were removed.

The literature shows a fairly large number of cases of blindness which has been relieved by surgical attention directed to the accessory sinuses of the nose. While in a few instances, the infective focus was in the ethmoid, maxillary or frontal, in the main the sphenoid was at fault. Few cases, however, have shown such a positive dependence on a process in the ethmoid or such a coincident and consisent recovery as the one here reported.

Case II. Unilateral scintillating scotoma; chronic ethmoiditis. Entirely relieved by exenteration of the ethmoid cells.

Miss L. L., aet. 16, August 27, 1913, had been having for the past two years daily attacks of severe left-sided headache with what she described as flashes appearing in her left eye. These attacks lasted for about five minutes, coming on with-

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out any apparent regularity during the day, and without any cause ascertainable on the part of the patient. Furthermore, they had not changed whatever in severity. Very naturally the young lady was very nervous and more or less incapacitated on account of the attacks. She was under the care of Dr. Post for some time, but treatment directed to her eyes and her general condition was without avail. In the hope that something might be found in the nose to account for the symptoms, she was referred to me. She presented no special nasal symptoms except that of sneezing, which she stated had been noted since she was a small child. She had had no headaches except as already specified. Family and other personal history good.

Examination of right nasal cavity showed nothing abnormal except some enlargement of the middle turbinate. On the left side there was a marked hypertrophy of the middle turbinate, the inferior being normal, and the septum not deviated. There was evidently a chronic ethmoiditis on the left side. Since this corresponded to the side on which the symptoms were declared, it was decided to remove the anterior end of the middle turbinate and to curette the ethmoid cells, although no promise of relief was given. The process was more extensive than I had foreseen, thickened mucous membrane without pus being found in most of the cells, and the anterior end of the middle turbinate being virtually an ethmoid cell of the type of a concha bullosa. An extensive exenteration was therefore undertaken. The patient suffered from a very mild attack on the day of the operation, but since that time, now nine months, she has not had a single attack.

So far as I have been able to find, no report has been made of a case of scintillating scotoma relieved by operation on the nose. In fact there seems to be no disposition on the part of the writers to associate it with disease of the accessory sinuses. Wilbrand and Saenger (Die Neurologie des Auges, Vol. III, part 2, 1906), who have written extensively upon the various forms of scintillating scotoma, say that little is known of its origin. They quote the following as to its etiology: "Moebius claims that in 90 per cent of the cases a neuropathic disposi-

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tion is demonstrable." According to L. Mayer and Ricchi the attacks frequently occur at menstruation, and according to Strehl the condition is brought about by puberty in one who has a hereditary predisposition. Antonelli holds that there is a relation between scintillating scotoma and neurasthenia, hysteria, epilepsy, tabes and progressive paralysis. Most authors look upon the condition as a form of migraine and ascribe to each the same etiology.

In my case it might be claimed that the operation was no more effective than any other form of operative or suggestive treatment. Admitting such a possibility, we must still take into account the extensive pathologic condition present on that side of the nose and absence of any promise of relief at the time of the operation.

At any rate, attention to the accessory sinuses in any similar condition will do no harm and may meet with an equally satisfactory result.

Finally these two cases bring again into our field of study the observation which was made in my paper on "A Study of the Anatomic Relation of the Optic Nerve to the Accessory Cavities of the Nose" (Annals of Otology, Rhinology and Laryngology, June, 1909), that under ordinary circumstances the optic nerve is in close relation with the ethmoid labyrinth only at the posteroexternal angle of the last posterior ethmoid cell. Where this relation exists there is only the slightest possibility of any danger to the optic nerve in suppuration confined to the ethmoid cells. But when the last posterior ethmoid cell replaces the sphenoid, the optic nerve runs close to and along the external wall of this ethmoid cell (as in two out of thirty specimens studied), and the vulnerability of the nerve is correspondingly heightened in view of the greatly increased portion exposed.

Without being able to demonstrate it, I feel that this is the relation of the posterior ethmoid cell to the optic nerve in the case of blindness reported, confirmed by the history and course of the disease, and the rapid restoration of vision following the exenteration of the ethmoid cells.

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Discussion.

Dr. Joseph H. Bryan, Washington: This is a very interesting subject and that of scintillating scotoma is entirely new to me in regard to sinus disease. Scotoma we all know who have done any work in this direction, is not at all uncommon. Dr. Wilmer and I have collected a large quantity of material and have found this in many sinus cases. The point Dr. Loeb brings up why these conditions come about is very interesting, why a distant suppurative condition in the sinuses should produce an active process in the eye, and why one close to the optic nerve should not produce any process in the eye is rather odd. In my experience it is the posterior ethmoid cells which are most at fault at the juncture of the sphenoid or the posterior ethmoid cell operating on the optic nerve as it comes through the canal. These cases where the wall between the sinus and the orbital cavity is very thin naturally may be due to some pressure effect, but when distantly situated with considerable bone between the cavity and the nerve it is rather difficult to explain, unless due to toxins, and it is my belief that there is some transmission of the septic matter to the nerve tissues which bring about these changes.

Dr. John F. Barnhill, Indianapolis: Dr. Loeb asks the question why we should have these eye troubles, and to my mind, gives the explanation at the end of his paper. Dr. Loeb's exhibition of specimens some years ago proved of such interest to me that I have since given more attention than I would otherwise have done to the relationship of the optic nerve to the posterior ethmoidal cells. In a study of this question I came across a specimen which was unique. I could well believe that anything could happen to the optic nerve in a case of posterior ethmoiditis in such an instance. The specimen shows that the whole optic canal runs entirely through one of the posterior ethmoidal cells much as would a sewer drain run through a cavity in the ground. The canal is attached at the base of the cell, while three-quarters of the circumference of that osseous tube runs directly through and is exposed. It seems incredible, looking at the very thin bone which surrounds the optic nerve throughout the half inch of length, that if this ethmoid cell were filled with pus, and the drainage impeded, such an eye would not be affected in some way as Dr. Loeb has explained. I think we have much to learn concerning these relationships.

Dr. B. Alexander Randall, Philadelphia: The over-stress laid by Ziem some thirty years ago on the nasal origin of

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ophthalmic disorders interested me and led me to look up the matter very carefully. Perhaps I had the first copy in Philadelphia of Zuckerkandl, and of the work of Berger and others, who have taken this subject up from the ophthalmic point of view. I have seen a good many of these cases, some of them of great interest; but all of these where the scotoma was scintillating seemed to be distinctly toxic in type and not dependent on anatomic relations. I have seen the blindness and fixed scotoma quite marked with more or less swelling of the optic nerve. One such case I saw with deSchweinitz, about which he spoke in the meeting of the Triological Society in Philadelphia several years ago. There have been in these cases almost invariably posterior ethmoid and not sphenoid trouble. This certainly deserves further consideration and study.

Dr. Hanau W. Loeb, St. Louis (in closing): I still say we do not know the cause of these things in spite of the fact that Dr. Barnhill states I have given the cause. If we could confirm this suggestion by post-mortem examinations, and it could be shown that the ethmoid cell has the relation I speak of, we could be more positive, but we must take the specimens we can find and judge from them. Ethmoid disease is more common than sphenoid disease, and when the latter sinus is affected the ethmoid is also, especially in the acute condition. I found in these anatomic studies that generally this last posterior ethmoid cell at its postero-external angle came the nearest to the optic nerve. Knowing, as we do, that the orifice of that is low down, and that the sinus is almost always empty of pus with that slight relation it would not affect the nerve to any considerable extent, if it is possible for the nerve to be affected by its propinquity. However, in two cases out of the thirty specimens this nerve, instead of having the usual relation on account of the ethmoid cells being pushed back over the sphenoid, the nerve ran along the lateral wall of the last posterior ethmoid cells, and along its lower portion, and was therefore in a far more vulnerable position than before. Onodi has ascribed toxic agents acting through the veins as the cause of optic troubles. Toxic conditions can act more positively when near at hand than when distant. I am not well versed in scintillating scotoma; the diagnosis was made by an oculist, and I found to my surprise that nobody in the literature referred to the nasal side as a possible cause. The boy is blind no longer, being now two years without trouble.

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NASO-PHARYNGEAL—MYXO-SARCOMA SEVERAL OPERATIONS AND FINAL SPONTANEOUS RECOVERY—UNDER OBSERVATION FOR 27 YEARS

BY E. FLETCHER INGALS, M.D.

In November, 1883, A. P., a boy of 13 years of age, came to me from a distant State complaining of obstruction of the nares and naso-pharynx and frequent bleeding, which had been troubling him for three months. There was nothing in the previous history to account for the disease, but twenty-seven years later he told me that a sister had died of cancer. The temperature was 99.5 and the pulse 115. The general condition was good, though he had been coughing for about three weeks. There was loss of nasal resonance in the voice, and I found the right naris filled by a growth which came within half an inch of the nostril, and the septum crowded so far over as to close the left naris; the naso-pharynx was also filled by the same growth. The fauces and larynx were normal, the chest and abdominal organs normal.

By repeated operations I succeeded in removing the greater part of the growth from the naris and naso-pharynx, but there was a part which extended behind and somewhat beyond the pterygoid process which could not be removed. A portion of the growth was submitted to Dr. C. E. Webster for microscopical examination, and he reported it to be a small celled myxo-sarcoma, the malignancy of which would depend upon the softness of the tumor and the rapidity of its growth. He thought this was liable to recur locally or secondarily in the lungs or liver. As it had grown to this size within about three months, it seemed to be a very unfavorable case. I used the cold snare many times and cauterized with the galvano cautery, and at other times with chromic acid some parts which could not be removed. I inserted into parts of the growth several times a pointed aluminum probe on which chromic acid had been fused; this was left in position about ten minutes until the tendency to bleed disappeared. If the probe were withdrawn at once there would be excessive bleeding. The

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most interesting of these operations (the seventh and eighth), were made about a month after the patient first came under my observation and were described in his record at that time as follows:

At various operations with the snare using steel wire, the ends of which were run through catheters passed through the naris and brought out of the mouth, I had removed a considerable part of the naso-pharyngeal tumor; and by the snare used through the nostril I had removed nearly all of that part of the tumor that could be secured from the front. I had also used gouge forceps through the naris to remove certain parts of the naso-pharyngeal growth; but this caused profuse bleeding. The snare was no longer effective because it could not be made to hold on to any part of the tumor. There remained of the tumor a mass filling one-third of the naso-pharyngeal cavity and three-quarters of the posterior part of the right naris. This mass grew from the right side and the posterior and superior surfaces of the naso-pharynx, and was also attached to both sides and the roof of the right naris for about 1 cm. forward from the posterior edge of the septum. Below this growth I had secured by the previous operations an opening at the lower part of the posterior naris about one-fourth the size of the choana. There was no part of the growth to which a snare could be applied. In this emergency I improvised from a piece of brass tube a trochar bent to fit the upper and posterior wall of the naso-pharynx, through which I passed a sharp-pointed copper-wire stillette. Passing this trochar through the naris I forced it through the growth at the upper outer angle of the posterior naris and brought it down into the pharynx. Then I passed through it and brought out of the mouth a No. 1 catheter. The trochar was then removed, the catheter being left in position. A similar operation was done on the inner wall of the naris, the catheter being left in position. Another catheter was then passed through the opening below the growth. I now had in position three catheters, two at the upper angles and one below. Through the upper two I passed the ends of a steel wire, the loop of which was subsequently brought in through the mouth to cut off the base of

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the growth, which was attached to the roof of the naso-pharynx. One end of each of two other wires was carried from the mouth through the same catheters and the other end of both of these through the lower catheter, the loops being brought in through the mouth to cut off the outer and inner attachments of the growth. The ends of each of these wires were secured in snares and they were tightened, but having in some way become crossed one wire cut one of the others off and as a result only one side of the growth was completely severed. Subsequently I repeated the operation to cut through the top and inner side of the growth, but all the wires were then carried through the canula of a single ecraseur, and as this was tightened both cuts were made completely at the same time. When the piece of tumor thus cut off had been removed, it was found that the nasal cavity and vault of the pharynx had been freed from the tumor, only very small portions remaining at the upper part of the vault and on the right side of the posterior part of the naris.

At the end of this time he went to his home for a few months, but returned in December, 1884. He reported that he had been very well and had suffered no more bleeding. He appeared to me about the same as when I last saw him. I found the remnants of the tumor in the naso-pharynx, slightly increased in size, but the portion in the right naris had grown forward nearly an inch. There was also swelling noticed in the right cheek which came from a portion of the tumor that might be felt and moved beneath the zygomatic arch. This portion was apparently about an inch in its longest diameters and about half an inch in thickness. It could readily be felt from the mouth just above the level of the upper teeth. The patient's general condition was very good and he was able to breathe through the nose fairly well. I tried electrolysis on the tumor, placing the negative pole inside of the mouth and the positive pole on the cheek. This was repeated five or six times, but appeared to have very little effect on the size of the tumor. I then injected the growth several times with 20 minims of a 3 per cent solution of carbolic acid, and continued frequent electrolysis on the nasal portion of the growth.

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The galvano cautery was also used frequently to destroy portions of the growth that could not be reached in any other way without causing excessive bleeding; but even with the cautery bleeding was sometimes severe. At one time, when the growth had not been touched for several weeks, severe bleeding occurred during the night.

The patient remained in the city this time until May, 1885, seeing me occasionally, sometimes six or eight weeks intervening between his calls at my office. During this time the late Prof. Gunn attempted to remove the tumor from the right cheek under the zygomatic arch by cutting through the cheek from the angle of the mouth back to the ear, but such severe bleeding occurred that he had to desist and close up the wound without having accomplished his purpose. Then I learned that the boy was running around the city with idle boys and getting into mischief, and I advised his father to take him home. At the time he left the city it is noted that the posterior part of the right naris was about nine-tenths occluded by the growth.

My next note was fourteen years later, March 29, 1899, when it was stated that after going home the tumor grew so that it made the right cheek very prominent and destroyed the vision in the right eye, and for a couple of years he could not breathe at all through the nose.

Afterward it appeared to have gradually atrophied until he could breathe through the nose very well; however, the septum had been crowded so far to the left, where it remained, that it four-fifths occluded that side. Both turbinated bodies on the right side had disappeared and an enormous cavity remained where the tumor had been. At this time the patient was suffering from rheumatic pains which kept him under my observation for about two months.

He called to see me again six years later, complaining only of considerable secretion in the naso-pharynx. The tumor had long since completely disappeared, but the deformity of the cheek and the absence of vision in the right eye continued. I saw him again in 1911. He was then in good health, excepting a slight asthmatic condition. The prominence of the right

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cheek, the bending of the septum to the left, the large cavity in the right naris and the blindness of the right eye were the same as at the last visit. Although this growth was of a semi-malignant character it followed the well-known tendency exhibited by fibrous growths in this locality, of retrogression, and final disappearance when the patient arrives at the age of from nineteen to twenty-three.

Discussion.

Dr. Harmon Smith, New York City: I wish to relate briefly a case of lympho-sarcoma of the tonsils and pharynx which I reported recently before the section on laryngology at the New York Academy of Medicine. A young man, twenty-three years old, was sent to me from the General Memorial Hospital, suffering with malignant involvement of the right tonsil, pharyngeal wall and palate, which was so extensive that he could not breathe or swallow with ease. His breath came in quick gasps and at times he became cyanotic. Without entertaining any hope that the operation would be successful further than relieving his distressing symptoms, I performed tracheotomy as a preliminary measure towards controlling hemorrhage. I then removed the tonsil and lateral pharyngeal wall, together with one-half of the soft palate. There was but little haemorrhage, although I took the precaution to pack the larynx with gauze, which was left *in situ* until the following day. The patient made an uneventful recovery. His symptoms all disappeared and he went out of the hospital with the promise of returning to the clinic for observation.

After about a year he came back with an apparent involvement of the opposite side. A microscopical examination of a piece of tissue confirmed the supposition. Again I performed a preliminary tracheotomy, removed the left tonsil, lateral pharyngeal wall and the remaining part of the palate. He is now apparently recovered from the second operation, the whole area being perfectly scarred over with healthy tissue. One complicating feature of the case is his tendency to epileptic attacks, which increase in frequency as the tumor increases in size. It has now been determined to do a decompression for the relief of brain pressure.

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THE RELATION OF THE TONSILS TO THYROID DISEASE

BY BURT R. SHURLEY, M.D.

The interest of the laryngologist in the manifestations of thyroid disease and the various disturbances of the ductless glands may be active from many lines of scientific investigation.

The literature of the subject is particularly voluminous in the fields of physiology, pathology and medical research, yet comparatively few reports have appeared from our own special realm of study.

It is true that in most communities the internist, the surgeon, the neurologist, and opthalmologist, diagnose and treat these patients without special or expert examination of the upper respiratory tract. The fault is no doubt ours, that we fail to find symptoms and lesions of sufficient interest to prove our value in the case.

It is a well-known fact that the State of Michigan for some mysterious reason is a geographic belt that includes an increased percentage of cases exhibiting disturbances of thyroid secretion.

The phenomena of symptomatology are so varied and extensive that the majority of specialties may classify these cases within their selected sphere, but in my experience the laryngologist is consulted frequently to explain and relieve the early neuroses and various symptoms of thyroid disturbance that are referred to the throat. The onsetting stage of a typical hypo or hyperthyroidism is usually overlooked or passed into that graveyard of diagnoses, neurasthenia, indigestion, "a run-down condition," or catarrh.

Although our wealth of experimental research has brought out comparatively few physiologic and pathologic facts, yet many of these are sufficiently definite to establish scientific diagnosis and therapy of genuine value.

It is reasonably certain that the thyroid pours into the lymph and blood streams a secretion of the greatest importance to organs and tissues of the upper respiratory tract. It is particularly the function of the thyroid to form a secretion

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whose physiologic activity is dependent on an iodized protein which is proportionate approximately to its iodin content. To utilize it is not to destroy it, but it is reabsorbed by the thyroid in a process of auto activity.

In the state of insufficient iodine feeding the simple goiter is produced as a compensatory hypertrophy. We are familiar with the increased consumption of oxygen in thyroid or adrenal feeding and the effects upon the heat centers and metabolism. The average amount of iodine in the normal thyroid is estimated at .3mg per gram of gland substance. It is manifestly obvious that the physiology of the thyroid and other ductless glands is profoundly affected by toxic disturbances in general and particularly those that enter by the lymphoid ring.

It is especially our function as laryngologists to realize the direct and definite physiologic and pathologic relation of the tonsils to the thyroid and to establish a routine investigation of the effects of tonsillitis, quinsy, and other infections of lymphoid tissue upon the upper respiratory tract. My attention was called to this subject by the beneficial results of a series of tonsillectomies for the relief of recurrent tonsillitis and quinsy, attended by incipient typical and atypical Graves disease. The prompt, permanent and prophylactic value of enucleation in this class of cases adds another definite indication to surgical procedure which is given no attention in the literature. As acute and chronic tonsillitis and peritonsillar abscess are recognized and important etiologic factors in incipient exophthalmic goiter, tonsillectomy may be classified then as a prophylactic measure in our new and fashionable department of preventive laryngology.

While it is the purpose of this paper to limit a discussion to the thyroid gland and its relations to the upper respiratory tract a fascinating and scientific field of research is developing in contributions to the inter-relations of the tonsils with the adrenals, pituitary body, thymus and ductless gland system in general.

The diagnostic signs of differentiation according to the

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degree of hyper or hypothyroidism established have been definitely classified by Beebe and Rogers as follows:

Hyperthyroidism: More common in young women, 18 to 30.

Onset: May be slow and gradual, or sudden and acute.

Tachycardia: 128-180; pounding beat felt over a wide area; often a loud systolic murmur over apex, base and along the great vessels. Irregular from, and very susceptible to the effects of exercise. Blood pressure variable, generally low, pulse soft and full, marked dyspnoea on slight exertion. Marked edema of legs.

Nervous System: Fine tremor affecting nearly all the muscles, twitching and occassionally spasma. Patients are abnormally irritable and excitable, apprehensive, mentally very active and physically restless. Muscular weakness prominent.

Eye Signs: Exophthalmos generally present, although it is not invariable. Occasionally unilateral, corresponding to the side having the enlarged thyroid lobe. Various symptoms arise in consequence of the exophthalmos. No pupillary changes.

Gland: Enlargement varies from nothing to very large goiter. The blood vessels over the gland are generally much enlarged and pulsate markedly. Right lobe generally the larger.

Nutrition: Severely disturbed; in most cases there is a loss in weight, which may progress to extreme emaciation. Appetite variable; vomiting and diarrhoea frequent complications. Patients drink a great deal of water.

Skin: Profuse perspiration, erythema, urticaria, dermographia; pigmentation, which may occasionally be so marked as to suggest Addison's disease. Hair falls out, but is not coarse and dry. Patients prefer thin clothing and cold rooms. They are more comfortable during cold weather.

Temperature: May be only slightly elevated, 99-100. With severe acute cases it runs often to 102-104.

Urinary Findings: In most cases normal in volume; glycosuria not unusual; polyuria often observed in later stages. Nitrogen proportions show a very much decreased kreatinin excretion, while kreatin is present in large amounts. Nitrogen loss is marked during the period of emaciation.

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Blood: Hemoglobin low, leucopenia in severe cases, with a marked relative lymphocytosis.

Menses: Very irregular or completely suppressed.

Hypothyroidism: More common in advancing years, 35 to 50.

Onset: Slow and gradual, in many cases engrafted on an old Graves' disease.

Heart: Rarely above 100, may be irregular with heaving impulse. Pulse generally shows high tension and the blood pressure is above normal.

Nervous System: Patient may have some tremor and muscular weakness is likely to be very pronounced, but there is not the same restlessness and jactitation. Patients are occasionally irritable, but they are generally dull and apathetic; mentally slow; memory defective. Pains in joints frequent, and referred to as rheumatism; there is a marked tendency toward sudden giving way of the legs when walking.

Eye Signs: Exophthalmos is unusual, although it may have been present at one time.

Gland: Often no enlargement can be made out; when there is a goiter it has an elastic, rubber-like consistance, occasionally cystic and nodular, but very distinctly different from the active pulsating gland of Graves' disease.

Nutrition: Generally not seriously disturbed; patients hold their weight and in most cases gain slowly; constipation rather than diarrhoea, and flatulency a toublesome habit. Patients do not drink much water.

Skin: Dry, may be scaly; patients do not perspire on exertion; hair and nails dry, brittle, and scalp scaly. Pigmentation not common. Patients prefer thick, warm clothing, and are cold most of the time. Much more comfortable during hot weather.

Temperature: Subnormal, may reach as low as 95.

Urinary Findings: Albuminuria is not unusual. Nitrogen proportions do not show so marked a disturbance in kreatinin and kreatin ratios. In large number of cases urine practically normal.

Blood: Hemoglobin low, white blood count normal.

Menses: Generally regular but scanty.

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While the degree of hyperfunction is in no relation necessarily to the size of the thyroid it is interesting to note that the family tendency as brought out in the hereditary story of thyroid, cardiac or nervous disease, is frequently of important influence.

The history of infection, shock, fright, overwork, great fatigue, mental strain, worry or accident will often mark the onset of an atypical or severe exophthalmic goiter.

As laryngologists we are ever alert to the influence of systemic disease upon the structures within our chosen fields of observation, yet we are prone in the hurry of routine office work to thrust aside deeper investigation. The unstable vasomotor nervous system, gout, rheumatism, neurasthenia, autointoxication, especially render the subject liable to annoying symptoms in the nose, throat or ears.

Some of these cases may be classified and identified as thyro-parathyroid insufficiency and appropriate treatment given with relief. We recognize marked cases of cretinism, infantalism and exophthalmic goiter, or senility, for example, without difficulty, but the considerable number of atypical forms of disease of the ductless glands with perverted secretions and attending pathologic change and discomfort pass frequently without further investigation.

The effects of thyroid toxemia and deficiency are so serious upon the nervous, muscular and cardio vascular system that we may find special and early symptoms in the upper respiratory tract.

When the routine examination of the nose, throat and ears includes the cervical, post-cervical glands, thyroid and thymus, it may be possible to abort an incipient Graves' disease or pulmonary tuberculosis. These conditions are frequently associated with low resistance to infection.

Our observation may include the size of the hypertrophy, consistence, shape, one or both lobes, diameter of the neck, pulsation or bruit. We may verify our suspicions before referring the case to the internist for diagnosis. The pulse will be observed as to rate, quality, arterial tension and effect of exercise. The nervous symptoms, especially, are those of

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tremor, twitching, jactitation, insomnia, dreams or disturbed mental condition. We may find also, dry or moist skin, dry, dead or falling hair, brittle nails, pigmentation, eruptions, dermographia, dyspnoea, fatigue, nausea, temperature.

Again we may return to the symptoms and signs in detail as observed in our special field.

In moderate or severe thyroid insufficiency we may find a dry mouth and throat increased with excessive dyspnoea on exertion. Voice husky or thick, muscles of throat tire more easily, defects or changes in speech. The mucous membrane of the lips, mouth, tongue, pharynx or larynx may be swollen and dry. The laryngeal muscles may show insufficiency.

Matthews has reported 289 cases of laryngeal paralysis in one thousand cases of goiter. Seventeen of which were bilateral. In my experience, a number of cases have exhibited slight motor insufficiency, according to the size of the goiter and the varying degrees of pressure. It would seem to me that as many of these cases have passing insufficiency it is scarcely tenable to term this condition laryngeal paralysis. It is quite remarkable that a change of voice is not necessarily in proportion to the degree of insufficiency.

Perversion of taste may occur. Howard observed six with abnormal taste in a series of thirty-two cases. Hume and Prudden report as high as one-third abnormal after a careful testing of the sense of taste. These occur usually in hypothyroidism.

In Graves' disease, taste, smell and hearing are rarely affected. In severe deficiency of thyroid secretion, hemorrhages from the nose, throat or gums are common. The amount of dyspoena may simulate cardiac or pulmonary disease of severe type. This modification of the oxygen supply due to the adrenal insufficiency may bring about a marked effect upon the hair, nails and skin.

Dyspoena in hyperthyroidism occurs after damage to the heart muscle has occurred. In Myxodema we occasionally observe an infiltration of the nasal mucous membrane, followed by a thickening and occasional obstruction by a gelatinous, waxy, or yellowish secretion. This may be attended by symp-

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toms of a cramped and swollen feeling in the throat. Pharynx and larynx may assume a bluish tinge or earlier a pale, yellowish color. Angio neurotic phenomena occur with relaxed or elongated conditions of the uvula. The inter-arytenoi fold may be transparent.

The dry and husky throat of Graves' disease may be attended by symptoms of cough, temperature, unilateral bruit, loss of weight, precordial pain, apprehension, and anemia, which may lead to a suspicion or mistaken diagnosis of pulmonary tuberculosis. In Graves' disease, hyperemia of the pharyngeal, bronchial and pulmonary mucosa is common.

The thyroid gland under hyper function is often hard, and in this condition gives rise to greater pressure, which is frequently the exciting cause of tracheal cough. This may be modified by change of position and improve with a softer consistency of the gland. Some of these cases exhibited periodicity in their intervals of exacerbation and quiesence.

The abnormal psychic condition of the individual upon his discovery of an enlarged thyroid gland immediately assumes a serious phase of apprehension unless he is managed with great care and foresight.

As apprehension is one of the predominating symptoms it is often possible, without very great care, to alarm these individuals and produce a serious hypochondriacal condition.

In considering the therapy of thyroid disease in general, it is understood that the great majority of drugs are entirely useless except when occasionally indicated for the control of special symptoms. An enormous number of therapeutic measures have received the endorsement of many splendid physicians. It is, therefore, a question of serious consideration to know what we can do for these patients that offers something of value.

The therapeutic measures which we adopt at the present time are those selected by elimination after a study of these individuals for many years. Rest and often a change of environment are absolutely essential to the ultimate control of thyroid disease. Psychic control and management, together with sedative therapeutic suggestion, is of untold value. The

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question of success in the treatment and recovery of incipient exophthalmic goiter will frequently depend upon these two essentials.

In myxodema, and particularly the atypical forms, great relief and permanent improvement is usually attained by a careful plan of administration of thyroid extract and iodine in carefully selected dosage of carefully selected preparations. The action of the thyroid protein is specific and within the realm of prompt observation. The secretions of the myxodematous throat and nasal passages become greatly improved, and the combination of the thyroid proteids of Rogers, the proteids of pancreas or adrenals and iodine will frequently bring about striking improvement. Proper use of the galvanic cautery—the anode electrode applied along the cervical sympathetic and the cathode applied to the neck, with a one milliampere current gradually increased, is often attended by an improvement in the consistency and size of the thyroid.

Operative interference, either ligation or enucleation, should not be postponed in cases where medical treatment does not show improvement after a reasonable time. The results depend greatly upon the skill of the surgeon, as a number of serious results might testify. The use of hypodermic iodine or the green citrate of iron is often of great service in rendering the vasomotor system more stable. Many cases of the myxodematous type improve greatly under the administration of pure iodine. The study of the individual cases alone can definitely determine this problem.

The internal secretions and their relations to pathogenesis, physiology and therapeutics deserve our most serious study. The role which they assume as oxygen carriers and active principles of stimulation to the blood cells of the body, deserve our interest. Their role in immunizing and sensatizing functions are worthy of increased scientific interest. Their influence as governors over the vaso-motor centers and regulators of harmony in the functions of the lymphoid tissue of the throat are indeed significant.

We are unable as specialists to unravel many of these great mysteries of bio-chemistry. We must call upon our laboratory

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colleagues with the spirit of research and untiring devotion to scientific investigation to solve these problems for us. It is possible for us individually to offer only our clinical mite. Yet it would seem that the laryngologist and otologist has sufficient interest in the newer fields of organo-therapy and pathology of the ductless glands to demonstrate that the thyroid and the tonsillar ring are involved in such a delicate and complex inter-relationship that our special opinion in this field of research may, we hope, soon prove sufficient to call the attention of the internist, the neurologist, and the general surgeon to the fact that an examination of the nose, throat, ears and larynx is at least, in all modesty, worth the effort.

Discussion.

Dr. Greenfield Sluder, St. Louis: I am delighted to hear Dr. Shurly's observations. I have been interested in this relationship for two and a half years. I have also started the observation in the Children's Hospital in St. Louis, with Dr. C. A. Gundlach, and a considerable number of children have been studied as well as adults, by us, in which there seem a clinical relationship between the lymphoid ring and the thyroid gland. The development of this district is by no means clear in the minds of anatomists. Just exactly what parts the various sections of the lymphoid ring develop is not settled. That the lingual tonsil develops from the same branchial arch as the thyroid is a fact, and in early foetal life there exists the thyroglossal duct which is closed early. It is sometimes found in the dissecting room. I have many times sought for this duct in the living but have not found it.

Dr. Shurly reports a singular betterment by the removal of the faucial tonsils. Our observations have been relative to the lingual tonsil, and in one case in which I did a perfect tonsillectomy some years ago I found a goitre this winter. The treatment in that child with a lingual tonsillitis resulted in marked shrinkage of the goitre, which was a simple hypertrophy. I have a considerable number of adults under observation, one young man of probably twenty-five, with an enormous adenoma in his neck that in the course of three months has shrunk some three-quarters of an inch in circumference. The gland is softened and the sense of comfort is greatly increased. That is the type of simple hypertrophy. Of hyperthyroidism I have had five cases. In four there was marked

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improvement by applications to the lingual tonsil. One was a case of long standing, operated on once or twice, in a woman by no means intact otherwise, who has so far not been improved. In another case of high grade striking exophthalmos and moderate adenoma, with a sense of impotency and general nervousness and tremor to such an extent that the patient was unable a short time since to feed herself, in that woman the first application to the thyroid gland was followed by a sense of betterment, which she described as less "tension." In the other cases under observation the thyroid has softened and shrunk, and in one very distinct and another less distinct has the exophthalmos receded. In one case in a child I saw the thyroid swell over night as the result of lingual tonsillitis; the tonsillitis got well, and in a few days the thyroid returned to normal size.

With regard to the application, it is silver in varying strengths up to a saturated solution, and salicylic acid in alcohol in saturated solution.

Dr. George B. Wood, Philadelphia: I am glad to hear Dr. Shurly's paper and Dr. Sluder's remarks on the relation of tonsillar infection to the production of hyperthyroidism. This matter was first called to my attention by Dr. Musser. One case in particular was that of a trained nurse who had recurring tonsillitis and exophthalmic goitre and hyperthyroidism following tonsillitis. The removal of her tonsils stopped the attacks for six months, and her goitre began to go down and the exophthalmos to disappear. At that time she had slight sore throat, followed by a less severe attack of hyperthyroidism, and after this attack I found on examination that at the operation I had not completely removed the faucial tonsils, there still being a piece in the upper part of the tonsillar recess. Removal of this piece has cured her and she has had no more attacks.

I have seen a few other cases in which the results while not so striking were sufficiently so to suggest some relationship. The thought in my mind was not that there was a direct relationship between the lymphoid ring and the thyroid gland, but rather that an infective process originating in the ring upset the metabolism of the body so as to produce goitre and hyperthyroidism, and that was also the view Dr. Musser held. He believed that almost all goitres and all cases of exophthalmos with goitre were more or less associated with some form of cryptogenic infection, and that if such infections could be located and removed, the results would be good.

Dr. Henry L. Swain, New Haven: Like Dr. Wood, I have

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long associated the two things together, the connection between the hyperthyroidism and the tonsillar ring, but I had only put them as occurring in the same individual, and merely thought that any infectious process in a patient with Graves' disease would exaggerate the symptoms. I have known this to occur with antrum disease, with lingual tonsillitis, and inflammation of the lateral columns of the pharynx. This I say, in spite of the fact that there are numberless cases which must have occurred to all of us in which the relation was established in this way, that in patients treated for lingual tonsil affections we find they cannot wear a tight collar when there is an acute exacerbation of the lingual tonsil enlargement. Yet I had been sufficiently stupid not to have thought that they were directly connected, and that any phenomenon of internal secretion could exist between the two conditions.

Dr. George E. Shambaugh, Chicago: Dr. Shurly's paper brings up a point of importance in connection with the work of the specialist. It is desirable for the specialist to correlate his work intimately with other fields of medicine. The tendency which we see in some quarters for the specialist to assume the entire responsibility for the treatment of the patient while under his care is as great a mistake as for a general practitioner to undertake the work in all the specialties. Particularly in our hospital work is it desirable to work in co-operation with men who are specialists in the other lines of medicine; the internist, the neurologist, the dental surgeon, and others. For this reason I believe that an isolated hospital devoted entirely to a specialty is not nearly as efficient as a special department in a general hospital. In a general hospital there are always cases where the opinion of the specialist in our field of work is desired, and cases which consult us primarily for some local trouble often require the opinion and care of an internist.

The problem which is discussed in Dr. Shurly's paper is one that has interested us for several years at the Presbyterian Hospital. The view which we have held has been along the line suggested by Dr. Wood, that the general systemic condition is the result of some focus of infection, often located about the mouth or throat. The phenomena of thyroid disease suggests very strongly a condition caused by some focus of infection such as infection around the teeth, or a latent infection in the faucial tonsils. This latter condition is often overlooked. When the systemic condition develops in connection with a severe attack of acute tonsillitis, as is so often the case, it is very natural that the faucial tonsils should be suspected

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as the focus. When the systemic condition occurs as the result of a chronic latent focus of infection in the faucial tonsils this relationship is very often not suspected, for the reason that the patient complains of no throat symptoms. I have very frequently discovered chronic abscesses in tonsils where the patient has not had an attack of tonsillitis for many years, as well as in patients where there has been no history of sore throat. Occasionally abscesses of this sort cannot be discovered by an examination of the tonsils before they are removed. The importance of this relation between foci of infection in the faucial tonsils and systemic disease of obscure origin is one of great importance, and is one which the internist is coming to appreciate more than the specialist.

Dr. Burt R. Shurly, Detroit (in closing): I would like to again call attention to the very great laryngologic interest these cases should have, and how frequently they are missed. Almost all the patients are of neurotic tendency, and such have an awful life to lead. If we can find some of them exhibiting these disturbances of the thyroid it will be of great benefit to put these people on the right track in the early stages.

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CHRONIC INFLUENZA OF THE NOSE AND THROAT.

BY LORENZO B. LOCKARD, M.D.

At various times cases have been recorded in which influenza bacilli, either in pure culture or in symbiosis, have been found during a period of several months, and in some instances for as long as one and two years.

Usually these have been cases of chronic bronchitis, pneumonia or tuberculosis, although a few have concerned individuals with rhinitis and otitis media.

The patient whose history I herewith record presents the unique spectacle of an infection of the nose and throat lasting twelve years, during all of which time cultures of the bacillus influenzae have been obtainable whenever sought for, whether or not subjective symptoms of the disease were present.

The chronicity of this case, its various clinical manifestations, and resistance to all surgical and medicinal procedures, together with the conjectural field it offers concerning recurrent attacks of tonsillitis, quinsy, coryza and sinusitis, make it well worthy of report.

History: The patient, when he first came under my observation because of a peritonsillar abscess, was thirty-five years of age.

For ten days after evacuation of the pus there was severe prostration, greatly exceeding that which one commonly sees in this condition.

A bacteriological examination, unfortunately, was not made, for it was not until later that its importance became manifest through the obtaining of the following history:

In 1903, seven years before the attack in question, while serving as an interne in the Presbyterian Hospital, of New York, he suffered from a severe attack of influenza, which terminated, after seven weeks, in a peritonsillar abscess.

An examination of the pus, made by the hospital pathologist, Dr. George A. Tuttle, showed a pure culture of the bacillus influenzae. In the succeeding two years three examinations of secretions from the crypts of the tonsils gave similar findings. One of these was made during an attack of follicular

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tonsillitis; the others while he was in apparently normal health.

Previous to the original attack he had been moderately robust; from then on he was constantly subject to more or less severe attacks of coryza, pharyngitis, tonsillitis and quinsy, each being characterized by so-called grippal symptoms.

In the course of seven years he had twelve peritonsillar abscesses, involving sometimes one, at other times both tonsils, and an unknown number of attacks of follicular tonsillitis. In 1904 he contracted pulmonary tuberculosis, which disappeared after one year's residence in the west.

Four months after the attack which first brought him under my observation he had a severe bilateral, follicular tonsillitis, accompanied by a vesicular eruption on the velum palati, the vesicles resembling small grains of sago. During this seizure, also, the constitutional symptoms were out of all proportion to the amount of local involvement.

This bore a striking resemblance to the cases of pharyngeal influenza described by Escat (1).

In the following November his tonsils were removed, and three days afterward a false membrane, similar in appearance to a mucosa cauterized by silver nitrate, appeared upon the palate and rapidly spread until the pillars on both sides, the uvula and posterior pharynx were completely covered.

This membrane, despite vigorous antiseptic treatment, persisted for ten days and gave pure cultures of the bacillus influenzae. During the entire period of convalescence there was marked prostration with severe pain in the joints, head and back, with a temperature that ranged from 100 to 103 degrees. A second examination of this membrane, after seven days, again showed the influenza bacillus.

In the succeeding two months three cultures from throat swabs were made by Dr. Henry S. Denison, all with similar findings.

Thorough cleansing of the pharynx and tonsils immediately before the cultures were taken, with alkaline washes, hydrogen peroxid, argyrol and iodine, had no appreciable effect in diminishing the number of bacilli.

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An autogenous influenza vaccine was administered at this time. Because of his great susceptibility it was found necessary to begin with a dose of only 1,000,000, which was gradually increased, but tolerance could not be gained for more than 10,000,000. According to Allen (2) this dosage is entirely inadequate. He recommends 50,000,000 as an initial dose in acute cases, and claims no result can be anticipated in chronic ones until from 20 to 50 million are given.

Even with the small dose given in this case there was always some reaction; two to three degrees of temperature and rather severe joint pains and general prostration for from 48 to 60 hours.

No influence whatever was observable upon the attacks of coryza from which he frequently suffered, and although positive cultures from the throat were always obtainable he had no additional attacks of pharyngitis.

In April, 1912, he contracted typhoid fever, and on the twelfth day developed a severe maxillary sinusitis. Until this time there had never been any symptoms referable to the nose, aside from the recurring attacks of acute coryza. The nose was cleansed and a straight trocar used for perforation of the antrum, through which a platinum needle was passed, thus making it reasonably certain that outside contamination was avoided.

A pure culture of the bacillus influenzae was obtained. The antrum rapidly healed. Ten days later a small alveolar abscess appeared over the second bicuspid; as the tooth was alive and the skiagram did not show necrosis, and all symptoms disappeared, no special treatment beyond incision was indicated. An examination of the pus could not be made.

Six months later, while in otherwise normal health, there was a recurrence of the antral suppuration, and again the influenza bacillus was obtained, this time in symbiosis with the streptococcus; spirilla and fusiform bacilli were also found. This examination was made by another pathologist, Dr. Roscoe Baker, of Denver.

All subjective symptoms disappeared after a few irrigations and a skiagram showed nothing abnormal.

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At this time he went to southern California for the winter, and while there a third attack developed. A month later a permanent nasal opening was made by Dr. S. McCuen Smith, of Philadelphia, and considerable pus evacuated.

An examination of the pus was not made at the time of operation, but three weeks later a negative swab was taken. There was marked improvement in the general health, and the antrum remained quiescent until the first week in July, three months after the operation, when suppuration occurred, accompanied by prostration, malaise and slight temperature, 99 degrees to 99½ degrees in the afternoon.

An examination by Dr. Baker showed the influenza bacillus in large numbers, in connection with the staphylococcus.

Again a very small alveolar abscess appeared over the second bicuspid, and a skiagram showed necrosis of the alveolus about this tooth and the first molar, and extending to the floor of the antrum.

On July 28, 1913, these two teeth were extracted and the necrosed portion of the alveolus and antral floor resected.

A culture taken from the extracted molar, at the bifurcation, showed influenza bacilli and staphylococci.

The opening was so large that three months elapsed before it was thought advisable to adjust a permanent plate and drainage tube.

On January 30, 1914, five months after the excision of the floor of the antrum, there was still a slight discharge. Cultures of this showed influenza bacilli in greatly reduced numbers and staphylococci.

A thorough search of the literature fails to reveal an analogous case, although an amazing number have been recorded with chronic infection of the lungs and bronchi.

A study of this case leads to a consideration of the following points:

1. The prevalence of influenza bacilli in non-epidemic periods.
   (a) In the secretions of normal individuals.
   (b) In the secretions of patients suffering from other diseases.

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2. The frequency of chronic influenza:
   (c) Of the lungs and bronchi.
   (d) Of the nose and throat.

3. Influenza carriers: their role in the causation of sporadic cases and of recurring attacks in the individual.

1. Prevalence of bacilli in non-epidemic periods.

The ubiquity of the influenza bacillus is much greater than commony supposed.

(a) B. Scheller (3) examined the secretions from the throats of 109 normal persons and found the bacillus influenzae in 25, 15 of whom gave a history of at least one attack of grip.

Holt (4) in an examination of 43 healthy persons had 16 positive and 28 negative cultures.

Two out of 20 throat swabs taken from normal persons by Davis (5 and 6) were positive.

Thus in a total of 172 normal individuals the bacillus was found 43 times, or in 25 per cent.

(b) In patients suffering from other diseases and not known to have influenza, the bacilli are found in a large percentage.

Wollstein (7), by swabbing the throat, recovered the bacillus in 16 of 37 cases of pneumonia; in 11 of 34 cases of bronchitis; in 8 of 18 cases of measles; in 8 of 16 cases of tuberculosis, and five times in 65 cases of other diseases.

Lord (8), during non-epidemic periods, in examining cases of what were presumably ordinary coughs, found influenza bacilli in 60 of 100 cases. In 29 of these they were present in overwhelming numbers.

Dr. L. Emmett Holt (4) had cultures taken of the throats of all the inmates of the Babies' Hospital in New York, including nurses and resident physicians, to determine what value could be attached to throat cultures as a means of diagnosis, and to ascertain the responsibility of influenza for the frequency with which respiratory infections occur in hospitals.

One hundred and ninety-eight person were examined.

Cultures positive, 85:

Suspected cases	42
Nonsuspected cases	43

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Cultures negative, 113:

Suspected cases	16
Nonsuspected cases	97

A summary of these cases, with those reported by Scheller (3), Davis (5), Allen (2), Boggs (9) and Grassberger, shows that out of 427 patients, 215, or 50 per cent, harbored the organism of influenza.

2. Chronic influenza.

Whether or not chronic influenza is to be considered a common disease depends upon whether the presence of the Pfeiffer bacillus is regarded as essential to a diagnosis. By a majority of the authors the clinical symptoms, even without bacteriological confirmation, are deemed sufficiently characteristic to be conclusive.

(c) These chronic infections are usually of the lungs and bronchi, although in a small number the nose and throat seem to play the predominant role. The usual period during which the bacilli are present in the sputum following an acute attack cannot be definitely stated. In typical acute cases they are present only for a few days, and disappear with the disappearance of the purulent secretions.

Leichtenstern (10) says: "Certain bacteriological investigations make it likely that the germs in convalescence may remain in an attenuated form perhaps fourteen days or longer in the various cavities, and later on again become virulent." He observed two patients in whom they persistd to the time of death, two years after an acute attack.

Osler (11) has seen three cases in which influenza bacilli persisted in the sputum for two and one-half years, and Ortner (12) reports six similar cases, four of which lasted respectively three, four, five and nine years.

Innumerable cases similar to the foregoing could be cited.

(d) Proved cases of chronic nasal and pharyngeal infection are rare.

As with general influenza, a chronic infection of this type may be assumed in the presence of certain clinical symptoms, such as those described in detail by Goodale (13) and Franke

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(14), but those in which bacteriological substantiation has been given are extremely rare.

Granby (15) has decribed a case of purulent rhinitis of four years' duration in which influenza bacilli were found.

Cultures of influenza bacilli were obtained from the nasal secretions of two chronic cases observed by Lord. In each case the nose was examined by Dr. A. Coolidge, Jr.; in one there was atrophic rhinitis, in the other a chronic purulent rhinitis. The influenza bacilli, in both instances, were associated with pneumococci and pyogenic cocci.

Lindenthal (16) reports the only two cases of chronic sinusitis, basteriologically proved, that I have been able to find, and in neither instance is the duration of the suppuration known. His description, however, implies that they were both of long standing.

In one case an autopsy was held upon a patient dead of some chronic disease. The frontal cells and right antrum were filled with pus which gave a pure culture of the bacillus influenzae.

The second autopsy was upon a patient dead of croupous pneumonia, who had had a cough and expectoration for one year. Influenza bacilli were found in the lungs. The right antrum and sphenoid were filled with pus; that from the sphenoid showed influenza bacilli, pneumococci and staphylococci; the antral pus contained only diplococci.

A case of chronic influenzal sinusitis of at least four and possibly twenty-three years' duration has been observed by my colleague, Dr. Roscoe Baker. This patient, although a physician, has refused to submit to either a rhinological or X-ray examination, hence the diagnosis must rest upon the subjective symptoms and bacteriological examinations. These, however, are so definite as to warrant report.

In 1891 he had a severe attack of influenza, accompanied by symptoms of maxillary sinusitis. One year later pain developed in the right cheek, with considerable swelling below the eye and a copious purulent discharge from the corresponding nostril. There was gradual improvement and at the end of two weeks he had fully recovered.

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Four years ago, while studying at the Polyclinic in Chicago, there was a recurrence of these symptoms, and an examination of the pus, made by himself, revealed the influenza bacillus. His findings were verified by Drs. Rosenow and Murphy. He was given an autogenous vaccine with some benefit, but the discharge has since persisted and amounts to about one half an ounce daily.

On July 14, 1912, this pus was examined by Dr. Baker, who found influenza bacilli and the staphylococcus albus and aureus.

In February of the present year the influenza bacilli were still present, associated with the streptococcus mucosus.

In sub-acute cases the bacilli in pure culture have been found in a few instances.

Lindenthal has had two such cases: one of three weeks' duration, and one in which the exact duration was unknown. In several additional sub-acute cases he found the influenza bacillus in symbiosis with B.coli communis.

In acute cases they have often been found, but not as frequently in recent years as during earlier epidemics.

According to Hajek (23) the influenza bacillus is the most frequent cause of sinus inflammation, and Zarnico (24) places it after the pneumococcus and streptococcus in the order of their relative frequency in the causation of suppuration.

Weichselbaum (25) claims that the sinuses are always affected during attacks of acute influenza, and Lindenthal demonstrated bacilli in the antral secretions in all of seven acute cases which he examined post-mortem.

In these cases, as well as in influenza otitis, there has been a steady microbic evolution. Primarily the bacillus influenzae was often found in pure culture; later it appeared in conjunction with the micrococcus catarrhalis, both organisms occurring in the same patient, or one in one and one in another, to-day the micrococcus catarrhalis is the one usually found and the bacillus influenzae only rarely.

Mainwaring-White (17) in an epidemic in 1909 did not once find the Pfeiffer bacillus in sinus cases, but in every one the micrococcus catarrhalis was present.

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To-day the majority of sinus cases following what clinically is the grip do not show the influenza bacillus, but the micrococcus catarrhalis, pneumococcus and streptococcus.

The same is true regarding acute otitis. As early as 1892 Scheibe (18) demonstrated the bacillus in the aural discharge, but to-day it is rarely found.

Holt made cultures of twenty-nine cases of acute otitis after paracentesis and did not find influenza bacilli in one, yet fifteen of these patients gave positive throat cultures. In eighty-five persons giving influenza cultures, there were seventeen cases of acute otitis, yet bacilli were not once found in the aural discharge.

These results seem to show that in general the relation of influenza to these conditions is the same as that which obtains in measles: the general infection furnishes the proper conditions for the development of other organisms already present.

These facts make clear the reason for the extreme rarity of chronic infections of the sinuses with demonstrable influenza bacilli, although the original cause of the infection may have been an undoubted influenza.

(3) The questions which have been considered have a strong practical bearing upon too little understood problems: the eruption of sporadic cases, and the frequent recurrence in certain individuals of local symptoms which may be clinically diagnosed as influenza, although unattended by constitutional manifestations.

It becomes almost certain, as we study the disease, that the explanation of its existence during non-epidemic periods is the same as that governing diphtheria, enteric fever, cholera, etc., *i. e.*, that there are influenza carriers who, showing no symptoms of the disease, may carry and distribute the specific germs without necessarily falling victims to them themselves. Such patients, however, usually suffer from recurring attacks of rhinitis, tonsillitis or bronchitis, which at one time may apparently be idiopathic in origin, at another typically grippal.

The role of diphtheria carriers in the dissemination of that disease is now fully recognized, and we know that patients harboring the Klebs-Loeffler bacillus may remain well a long

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time and then fall victim to the disease, and the same is even more true of influenza, for influenza infections do not protect, but rather predispose to recurrences.

Park and Williams (19) upon this subject say:

"Sporadic cases or the sudden eruption of epidemics in any localities from which the disease has been absent for a long time, may possibly be explained by assuming that the bacilli, as already mentioned, often remain latent in the lung or bronchial secretions for many months, and perhaps years, and then become active again, when under favorable circumstances they may be communicated to others."

Osler (11) voices this view as follows:

"Some patients who have once suffered from influenza seem to be especially liable to recurrences, which may be due to the persistence of the bacilli, undetected, in the upper parts of the respiratory tract, causing autoreinfection. In interepidemic periods the respiratory infection with influenza bacilli cannot be distinguished from infections with other organisms, such as micrococcus catarrhalis, without a bacteriological examination."

Jordan (20) writes:

"Influenza sometimes exists in a chronic form, in which the bacilli appear in the nose and throat secretions for months. The micro-organism is also found in a considerable portion of healthy persons. Its presence and persistence in the nasal and bronchial secretions of convalescents and chronic cases, in the sputum of consumptives, and even in the mouth and nose of healthy persons who have been in contact with influenza patients, affords a ready and plausible explanation of many of the phenomena of distribution and transmission."

Madison (21) reports a case that shows the danger of infection being transmitted in this way. A woman suffered for twenty-two years with a cough, and during a period of twenty years had recurrent hemorrhages. The daily expectoration was between six and eight ounces. No tubercle bacilli were found, and the Moro tuberculin test was negative, but the bacillus influenzae was present in almost pure culture.

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The father and mother and all of her seven brothers and sisters contracted chronic bronchitis, as well as four of her ten children. An additional child died at nineteen months from some respiratory disease.

Positive evidence is lacking that these respiratory conditions were all influenzal in origin, but there are strong reasons for believing them to have been so.

Outside the body the bacilli are of short life; in haemoglobin cultures they remain alive for as long as seventeen days. In blood boullion cultures at 20 deg. C., they retain their vitality only for from two to three weeks.

Neisser (22) was one of the first to show that this vitality is greatly increased by association with other organisms. He has demonstrated that the best "nurse" is the bacillus Prodigiosus, and succeeded in keeping the influenza bacillus alive for twenty generations when the two were grown symbiotically.

There are reasons for thinking that killed cultures of streptococci may increase the virulence of the bacillus for animals. He concludes:

"If this proves true it opens up an interesting field for speculation as to the origin of the epidemics of influenza, suggesting that Pfeiffer's bacillus may live, possibly for long periods, as a harmless saprophyte in conjunction with other bacteria, and be suddenly raised in virulence as a result of its entrance into the body in conjunction with the streptococcus or some other pathogenic bacteria."

Their frequent discovery in normal throats and the warranted supposition that they remain latent in the sinuses for long periods of time indicate, as pointed out by Davis, that they may exist as organisms with a potential pathogenic function awaiting an opportunity favorable for development.

This favorable opportunity develops under certain climatic and bodily conditions when, owing to lowered resistance or the accidental entrance of other organisms, the bacilli increase in number and virulence, and become capable of transferring the disease to others, or of producing symptoms in the individual who has previously harbored them with

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impunity. The case cited by the author gives considerable weight to this view.

Treatment.—No treatment, aside from that which depends upon raising the resistance of the individual, has been effective. Vaccines have been largely unsuccessful. Only a few cases have been reported in which any effect whatsoever has been observed.

Fisher (26) reports one case successfully treated with an autogenous vaccine made from the influenza bacillus and the pneumococcus, and Granby, in the case of chronic rhinitis previously referred to, noted great improvement from a vaccine, but a complete cure was not obtained.

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LOCAL LESIONS OF THE MUCOUS MEMBRANE OF THE UPPER RESPIRATORY TRACT DUE TO SYSTEMIC CONDITION.

BY D. BRADEN KYLE, M.D.

While there are many so-called local lesions of the mucous membrane of the upper respiratory tract, yet it is a well-known fact that many of these lesions do not yield to local treatment, but are dependent upon some underlying systemic cause. It is this particular class of lesions that requires individual study of individual cases. Ulceration, coughs, tendency to take cold, sensitive and irritable mucous membrane, all come under this class of lesions.

For the past twenty years I have been making a study of the chemical analysis of saliva with its relation to certain diseases of the upper respiratory tract, and in certain individual cases there is no question that the diagnosis can be made from this basis. I will not burden you with a repetition of the general subject, but will refer you to the articles: "The Import of the Salivary and Nasal Secretions in Hay Fever" (1903), "The Etiology of Hay Fever" (1904), "Chemistry of Saliva in Relation to Hay Fever" (1907), "The Relation of Diseases of the Upper Respiratory Tract and General Systemic Conditions" (1912), and "Chemic Diseases of the Upper Respiratory Tract" (1912).

It is my purpose, then, merely to give a working outline for investigating these individual cases, and the laboratory data does not include the organic chemistry involved.

The normal salivary secretion shows a trace of ammonia. When the ammonia appears in excess quantity it acts as an irritant and the gums are usually found to be reddened and receding. The membrane lining the mouth, pharynx and nasal passages is also reddened and sometimes dry. Such conditions obtain particularly in hay fever, rose cold and allied states.

The indication is, obviously, to reduce the ammonia excess to the normal trace or to change entirely the reaction from an alkalinity due to ammonia to one produced by the presence of

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other non-irritating substances. Clinically, it has been found that this change may be brought about by the internal administration of alkaline sodium or potassium salts. The ammonia being highly volatile readily combines with these salts with the result that the glands whose ducts open on the surface of the mucous membrane of the nose and mouth produce a secretion in which the alkalinity is due to the presence of sodium or potassium, instead of ammonia, and is non-irritating when poured out on the surface. Under this altered condition the highly reddened and irritated appearance of the membrane subsides and all symptoms of nasal irritation promptly disappear.

Chemical and Physical Examination of Salivary Secretion.

Collection of Saliva: About 10 c.c. of saliva should be collected in a clean glass bottle and examined as soon as possible. The secretion may be promoted by holding the mouth widely open for a few moments at a time or by chewing paraffine. The mouth should be clean, but the saliva should not be taken too soon after using any of the various tooth preparations, since the presence of such might alter the salivary reaction.

Organoleptic Properties: Under this head is noted: Color, transparency, consistency, sediment, sapidity, odor, crystalline salts.

Chemical Examination: An ordinary porcelain tablet of six cells is used. Into each cell about one-half c.c. saliva is poured. The reaction may be taken with litmus paper, but if the reaction is near the neutral point it is sometimes very difficult to determine accurately whether the reaction is slightly acid, slightly alkaline, or neutral. A better method consists in the use of two solutions of phenophthalein, one solution just sufficiently acid to remain clear, and the other only sufficiently alkaline to remain pinkish in color. To make the test, add one drop of the clear solution to one portion of saliva. If a slightly pinkish color results the reaction is alkaline, but if the color remains clear the saliva may be either acid or neutral. One drop of the pink or alkaline solution is then added to another portion of saliva. If the reaction is neutral,

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the pink color remains, but if the pink color is lost immediately the reaction is acid. It should be borne in mind that the reaction may change very soon after the saliva is secreted, and for that reason the examination should be made at once when possible.

The saliva is then tested for the presence of sulpho-cyanid of potassium, ammonia, chlorides and acetone. The reagents necessary are a 10 per cent solution of ferric chloride in distilled water, Nessler's reagent, a 5 per cent solution of potassium chromate, a 5 per cent solution of silver nitrate, von Jaksch's solution, and a strong solution of sodium hydrate.

The worker must familiarize himself with the action of his set of reagents on normal saliva, as his results are simply qualitative and the substance tested for is stated as increased, normal or deficient, depending on the nearness of the color or the reaction to that obtained in the average healthy specimen. One drop of the reagent is employed. Ferric chloride produces from the faintest pink to the most intense vermilion color, the normal reaction must be mentally compared with that under examination and the result noted in reference to the sulphocyanid content. The ammonia content is seen and expressed in a similar way after addition of Nessler's reagent.

The chlorides are determined by the addition of a very small drop of the potassium chromate solution, followed by a drop of the silver nitrate solution—the resulting reddish silver chromate being soluble and disappearing in proportion to the quantity of chlorides present. A substance similar to glycogen is precipitated on the addition of von Jaksch's solution, and, if to this mixture a drop of sodium hydrate solution is added, the presence of acetone is demonstrated by the odor of iodoform, which odor must be distinguished from that of the periodates sometimes formed.

The above laboratory outline does not apply to the quantitative analysis. The methods employed for this in organic chemistry are necessarily long and complicated.

I lay great stress on the determination of the predominance of sodium or potassium salts in the saliva. The process I use for this determination consists, first, in evaporation of the

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saliva to small bulk over a water bath, it being better to use for this purpose the dialyzed saliva to rid the concentration of the otherwise glairy consistence. A faint crystalline precipitate on addition of hydrochloroplatinic acid is an indication of potassium, while a similar result, when potassium pyroantimoniate is added, indicates sodium.

A reaction may occur with both tests when a mixture of the salts is present, or for the same reason, or because of the very small amounts present, no visible reaction may occur. At best, the reactions are not pronounced and the tubes may have to stand some hours before a judgment can be given.

The use of the micropolariscope has made possible the recognition of many salts which, under the ordinary objective, have little or no distinctive character.

The absence of the normal salts, as well as the presence of abnormal ones, is of importance. For any degree of success here, the saliva must be dialyzed before being placed on the slide for examination; the slides are in best condition from three to ten days after they are made.

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RECURRENT LYMPHOMATA OF THE LARYNGO-PHARYNX — PRESENCE OF STREPTOCOCCUS HAEMOLYTICUS IN THE GROWTHS EXCISED AND IN AN ASSOCIATED SPHENO-ETHMOIDAL DISCHARGE — AUTOGENOUS VACCINATION—ARREST OF RECURRENCE—RECOVERY.

BY W. E. CASSELBERRY, M.D.

The cells and larger bone spaces of the head, known as nasal accessory sinuses, are so hidden from casual observation and so indirect in manifestations of disorder, that few have realized the widespread occurrence of "sinus disease." Its synonym, "sinus suppuration," is scarcely an equivalent term, since the discharge may not amount to actual pus and yet be fraught with evil consequences; for it lies decomposing in the cells, its drainage impeded by narrowed portals, until forced thence, upon its voyage of secondary infection, through the nose, throat and alimentary tract. But very few of the lines of secondary infection have been definitely traced, the following being an addition to the list and one that opens vistas of future enlightenment.

While the cause of tonsillar hyperplasia in general remains a mystery, the author has long been conscious of a relationship of cause and effect between sinus disease and certain lymphoid enlargements observed to affect parts over which the infectious discharge flows, a causal relationship of the sort being now substantiated, to the extent, at least, that manifold extreme enlargements of isolated lymphoid glands of the throat are found to have been excited and maintained in chronic form, through infection by spheno-ethmoid sinus discharge. The relationship is significant in support of the modern conviction that rheumatoid, cardiac and pyaemic diseases lead out from local foci of infection, but it shows the necessity of searching effectively for the focus "higher

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up" than the tonsils themselves, since tonsillar disease may be but secondary to nasal accessory sinus suppuration. A tonsillar hyperplasia of this secondary infectious type, though not limited, is apt to assume a pale, soggy, flat formation which favors retention by compression of the crypts, and multiple enlarged follicles in front, on the pillar and plica, and grouped below its lower pole, may lend to the tonsil an appearance of having overflowed its bounds.

The other lymphoid characteristics observed in the pathway of infectious sinus discharge are a conspicuous enlargement of isolated follicles in situations where normally they are inconspicuous or invisible; an apparent lymphoid infiltration of adjoining tissue, and a decided disposition to recurrence after removal, all of which affect especially the fossae and folds around the Eustachian tube, leading to deafness by obstruction.

In the following description the term lymphoma is used in its broad sense for the sake of brevity. Under it, Virchow includes all tumors and swellings composed of lymphoid tissue, and though later authorities seek to limit it to true neoplasm, other lymphoid growths are still commonly known as lymphomata. It will suffice to specify, "Infective lymphoid swelling" as the sort of lymphoma to which reference is made.

In the absence of any implication of the lymphatic glands, there was no question of leukemia, and the same may be said respecting carcinoma—sarcoma being negatived by microscopic test.

In size and shape they were not unlike clusters of large, white grapes, compactly ranged on each side of the laryngopharynx, where they filled the pyriform sinuses, overrode the arytenoids and encroached upon the lumen of the larynx. Each of the upper pair, designated for future reference as Nos. 1 and 2, right and left, respectively, was divided by the edge of the epiglottis into a larger lobe above, and a smaller lobe lying below the pharyngo-epiglottic fold. To this fold the single elongated base of the two lobes on each side was, in the main, attached, the rest of its attachment following the ridge which courses between the pharyngo-epiglottic fold and the lower

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pole of the tonsillar fossa, being, therefore, in line with a chain of isolated lymphoid follicles[1] available for overgrowth by infection. Although at first only the two upper lobes were visible, being so large as to obscure the lower lobes, and the other lymphomata not yet well grown underneath, there were in all six separate and distinct growths, arranged in three pairs (Fig. 1). Each of the middle pair, designated as Nos. 3 and 4, right and left, respectively, was attached to the corresponding aryepiglottic fold. One of the lower pair, No. 5, on the right, was merely rudimentary, but paired symmetrically with No. 6, attached to the posterior plane of the left arytenoid, near the cartilage of Santorini. These sites are among those specified by Heitler[2] as containing isolated lymphoid follicles. Though ordinarily invisible in this situation, they should no longer be ignored, as in the light of the present instance their presence in connection with a sinus discharge gravitating to this vicinity, explains many other slighter degrees of hyperplasia at the arytenoids, usually classed as chronic laryngitis, but which really represent infections of the lymphoid glands. The outlook for the same condition in the deeper air passages is one of the "vistas" opened for future enlightenment.

The faucial tonsils had been totally enucleated by the writer, one twenty-five years ago and the other five years ago; the first one by reason of extreme hyperplasia, to which, in general, the lymphoid structures of the throat had shown decided tendencies both before and since the tonsillectomies. Viewed, therefore, in connection with the total absence of faucial tonsils, the evident lymphoid swellings, Nos. 1 and 2, in gross appearance and somewhat in detail, at first their upper lobes alone visible, looked very much like a pair of misplaced tonsils, as if corresponding to Rosenberg's "Tonsilla Succenturiata,"[3] better known as aberrant tonsils, meaning thereby compensatory growths separate from but similar to tonsils. After the

[1] Luschka—Virchow's Archiv., Vol. V. Cited by Bosworth, Vol. II., p. 454.
[2] Heitler—Med. Yahrbuch, Vien., Vol. IV., p. 374. Cited by Bosworth, Loc. cit.
[3] Rosenberg—Mundhohle des Rachens und des Kehlkopfs, zweite Auflage S., 191

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style of tonsils, this pair of lymphomata was enveloped by folds of smooth, loose, but very pallid mucosa, reflected in front and behind from the lateral wall of the laryngo-pharynx, which imparted to the swellings a tonsil-like contour, and a por-

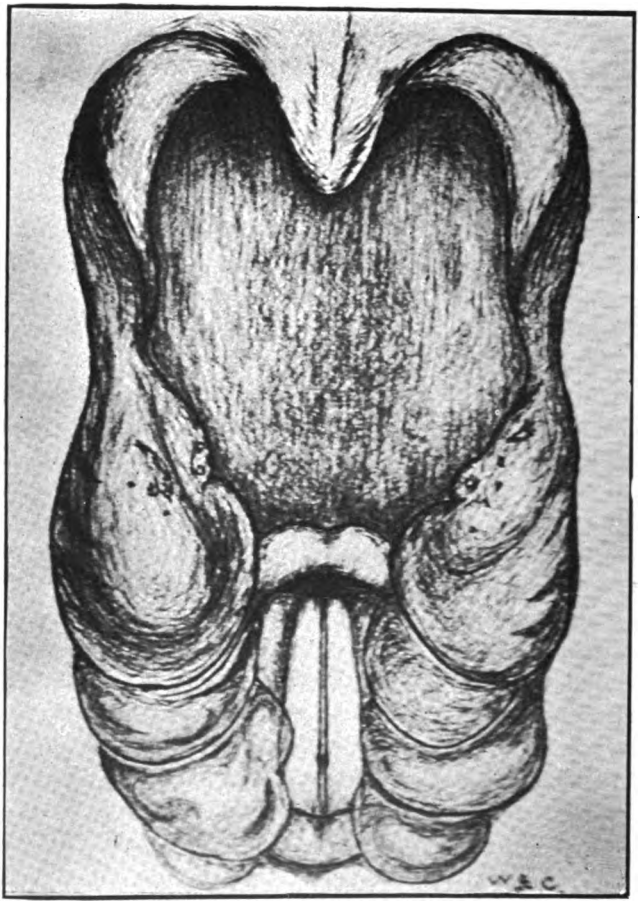

Fig. 1.

Multiple lymphomata of the laryngo-pharynx which proved to be of infectious origin. The upper pair, composed each of two lobes, was attached to the pharyngo-epiglottic folds, the middle pair to the ary-epiglottic folds and the lower pair to the arytenoids.

tion of the inner surface, as in the tonsil, but a smaller portion, being free of covering, showed a few minute, shallow, crypt-

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like orifices. In fact, the striking similarity in structure seemed almost to justify the patient's own comment, that "Nature was determined he should have tonsils."

But, that the minute isolated lymphoid follicles of the laryngo-pharynx should, so late in life as 54 years of age, develop spontaneously without definite cause into overgrowths so unusual in multiplicity and size; so unusual in situation, respecting, at least, the lower groups, and so unusual in rapidity

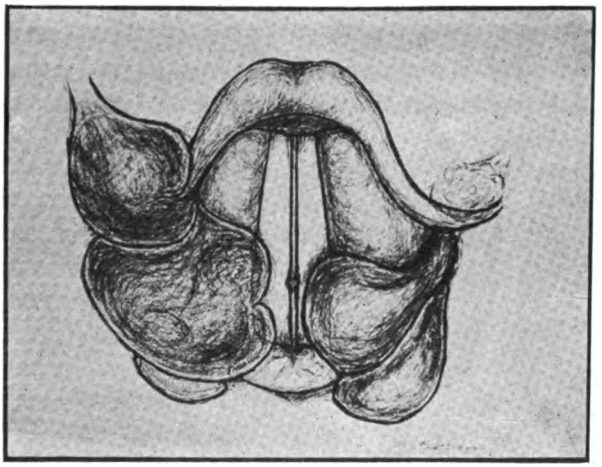

Fig. 2

Showing the middle pair of lymphomata "bowed" over the glottis, after the surgical removal of the upper pair, one of which, the uppermost shown, has partially redeveloped.

of development, six months being the estimated period, was, in the experience of the writer, entirely unprecedented and seemed unacceptable as an explanation of their existence. As they continued to develop with rapidity, three months later Nos. 3, 4 and 6 had advanced into view, despite the further expansion of the ones above, and the symptoms were becoming urgent, the former complaint, simply, of "something there," having been augmented by embarrassing enfeeblement of the voice, audible breathing and so-called "choking spells."

To relieve this menace to respiration and with a view to future guidance from the microscopic examination of the

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specimen, No. 1, the largest of the swellings, was removed by operation November 11. But the respiration grew worse rather than better, notwithstanding the specimen turned out to be much larger than the growth had appeared *in situ*. Nor was there much relief following the removal of lymphoma No. 2, its upper lobe on December 2, its lower lobe on January 9. However, through the space so provided, the precise reason for continuation of the dyspnoea and for its occasional choking character was located in the middle pair of lymphomata, Nos. 3 and 4, in that, sagging toward the opening of the larynx, any forcible inspiration would bow them together over the glottis, like a pair of folding trap-doors (Fig. 2). The removal of

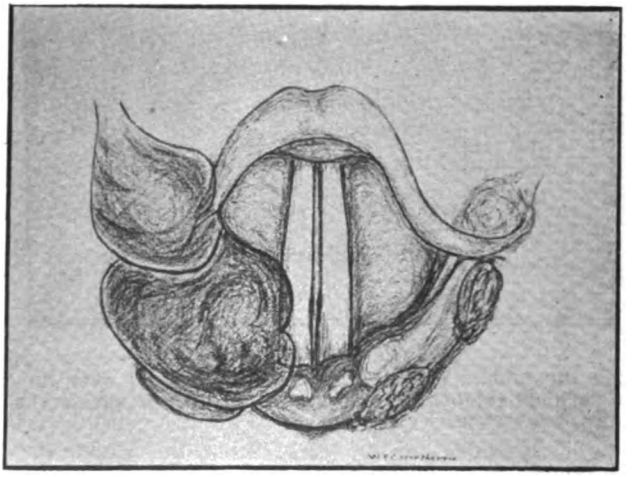

Fig. 3.

The condition at the beginning of autogeneous vaccination after cessation of surgical treatment. Lymphoma No. 3, the largest in this figure, not having been disturbed surgically, now served, together with the recurrence of growth No. 1, adjoining it above, to mark the efficacy of vaccination.

No. 4, the worst of the pair, together conveniently with No. 6, on the same side, but not No. 3 opposite, on January 29, remedied, for the time, although not wholly, the difficulty in both speaking and breathing.

All the specimens confirmed the various points of similarity to tonsils, yet on section they were unlike tonsils in color,

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texture and consistency, cutting more like butter and leaving pale, smooth surfaces, but penetrated here and there by crypts. The report of the microscopist, Dr. T. L. Dagg, of the Chicago Laboratory, was: "A simple hyperplasia of lymphoid tissue corresponding to that of the tonsil. No evidence of malignancy." The bacteriologic examination was made from the lower lobe of lymphoma (No. 2), sent immediately on removal with care to prevent contamination, to Dr. E. C. Rosenow, known as an expert, who reported the presence in the tissue, in large numbers, in almost pure culture, of streptococcus haemolyticus, the same organism which recently had been found responsible for endemics of a severe type of infection of the throat and cervical lymphatic glands.

A microbic origin, as one of the possibilities, had come up in discussion with the patient who is himself a physician, an internist of wide experience, who suggested that a spheno-ethmoidal discharge from which he suffered, might be the source of infection. But, that multiple, non-suppurative overgrowths of lymphoid tissue could, as an actual fact, be so excited and maintained in chronic form, especially by a streptococcus, came to us as a novelty to be accepted only with reserve pending any obtainable confirmation. In this connection, if only as a straw in the wind, it was recalled that, though conducted aseptically, the first operation, but none of the subsequent ones, had been followed almost at once by an unexpectedly severe reaction, the temperature within six hours having reached 103° F. Presumably an infecting agent, inherent to the growth itself, had been let loose, a presumption which, considering the presence in the growth of the streptococcus haemolyticus, seems not an unreasonable one. However, the confirmation, in small measure, came with the next report of the bacteriologist, that the spheno-ethmoidal discharge also contained the streptococcus haemolyticus. The real and practical confirmation, however, was found only upon trial of the autogenous vaccine. Nothing confirmatory could be expected from the literature excepting as based, in general, upon analogy, but a cursory search was made in connection with other phases of the condition.

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John Mackenzie[4] and Lennox Browne[5] have each described a lymphoma the size of a bean, the one in the pyriform sinus, the other at the lingual base, removed in each instance by the snare without recurrence, and under the name fibrolymphoma, Lennox Browne[6] depicts in water-color a single pair of growths which resemble somewhat the upper lobes alone of Nos. 1 and 2. Other authors refer vaguely to the occurrence of lymphomata and a few describe similar growths under the noncommittal name of polypus. None of these was multiple, none persistent in growth, and none had any cause assigned. But it is not doubted that an exhaustive search would disclose similar conditions excepting with respect to the cause through infection by streptococcus haemolyticus and its confirmation as the cause by successful autogenous vaccination, after the practical failure of other treatment; for pending preparation of the vaccine, ten external exposures to the X-ray had failed even to retard the redeveloping process then under way. The recurrence had commenced with lymphoma No. 1 being favored by the fact that the similarity in formation to the faucial tonsil, had ceased near its base, in that it was not fully encapsulated, hence could not be totally enucleated. Though dissected loose, and deeply severed on the stretch, there was left by the snare a lymphoid nucleus from which the growth had reattained within the two months about one-third of its former size. Unmistakable, also, were the indications of recurrence at the site of lymphoma No. 2, and the same was to be expected of Nos. 4 and 6. In fact, already the respiratory and vocal difficulties were reasserting themselves.

It was in the face of this discouraging prospect that our hopes were centered upon the autogenous vaccine, and all other treatment was suspended, despite the fact that lymphoma No. 3, forming the right half of the "folding trap-doors," had not yet been reached for surgical removal, and with increased

[4] John Mackenzie—"Jour. Am. Med. Assoc.," Abs "Jour. Laryn. and Rhin."

[5] Lennox Browne—The Thoat and Nose, Etc., 5th Ed., London. Plate VI., Fig. 48, p. 410.

[6] Lennox Browne—The Throat and Nose, Etc., 5th Ed., London. Plate VI., Fig. 50, p. 410.

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growth, it had become even without its fellows an impediment to free breathing. It was now purposely left without surgical interference to serve as a gauge by which to mark the efficiency of the vaccine.

A minimum initial dose, as expressed in the appalling numbers peculiar to vaccine products, of 50,000,000, was advised, but a dose of 500,000,000 was taken. The effect was comparable only to that, at which one marveled, in the early days of diphtheria antitoxine. The change commenced within twelve hours with relief from irritation in the throat and was marked within two days by a visible diminution in size of the recurrent growth No. 1 and of lymphoma No. 3, while the temporarily wrinkled covering of the left aryepiglottic fold bespoke considerable reduction of its inner substance (Fig. 4).

The further retrocession under bi-weekly doses of 50,000,000 is best told by reference to the illustrations with their inscriptions (Figs. 3, 4, 5, 6), which show at intervals of two

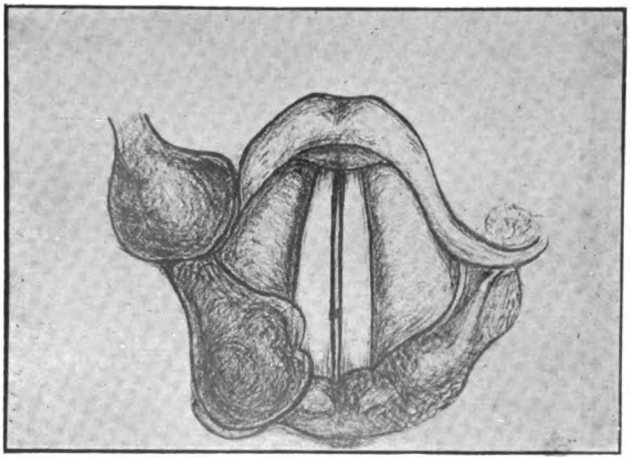

Fig. 4.

Two days after the first vaccination the change was marked by reduction in size of lymphoma No. 3, recurrent growth No. 1, and the previously swollen left aryepiglottic fold, causing temporary wrinkling of its mucosa which did not keep pace in shrinkage.

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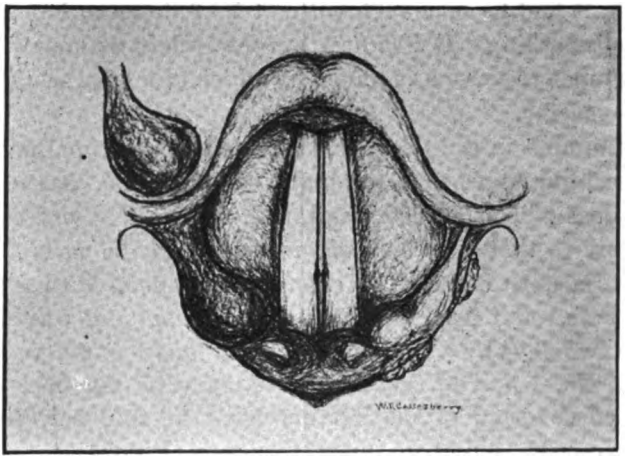

Fig. 5.

At the end of two weeks, under bi-weekly vaccination, there was a marked reduction in the size of the growths and of all indications of recurrence at former sites.

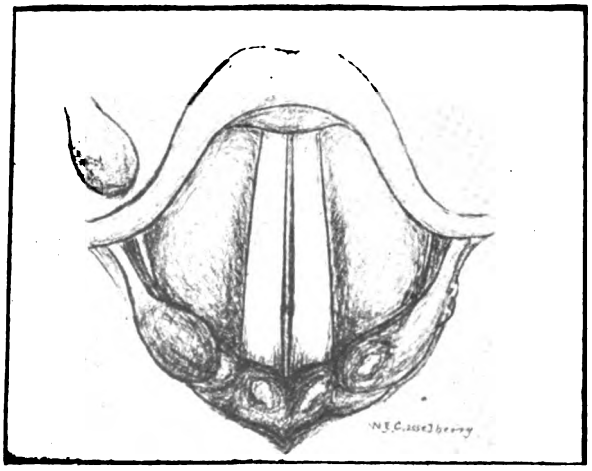

Fig. 6.

At the end of four weeks, remnants only of Nos. 1 and 3 were perceptible and thereafter practically nothing remained.

weeks the uninterrupted reduction in size down to a practical disappearance of all the growths, their remnants and recurrent

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swellings, which, within the few months time since elapsed, have shown no disposition to return.

The mixed microbic flora present in the discharge itself explains, in part, the less satisfactory effect of vaccination upon the spheno-ethmoidal disease and upon sinus disease in general, the result in this instance, however, being largely favorable. Drainage had been surgically assisted a couple of years previously, but after the vaccination, without other measures, the patient estimated a further reduction in the discharge down to less than one-eighth of that preceeding the vaccine treatment.

Discussion.

Dr. Joseph L. Goodale, Boston: I am very much interested in this case as I am reminded of one which I saw in 1907 and which I reported the following Winter in Philadelphia. A woman whom I was asked to see showed an enormous enlargement with induration of the left tonsil, the induration continuing behind the tonsil and without any sharp line of demarcation to the base of the tongue and down to the larynx, rapidly increasing, so that within a few weeks from the beginning of the symptoms to the time when I saw her it had produced actual dyspnoea and inability to swallow. The question was whether we should do a tracheotomy or attempt to remove the growth, but in examination under ether the growth was found so extensive that we decided not to operate. During the next week we endeavored to excite an autogenous pus formation or vaccination by the injection of turpentine under the skin. At the same time we gave her the staphylococcus aureus. The result was that within three days she was able to swallow and within a week she could breathe perfectly. This was in May; when I went away the last of June she had left the hospital and examination showed nothing in the situation of the former growth. When I saw her again in the Autumn the site of the growth was represented by a stellate cicatrix. She then disappeared from observation. I saw her last Spring; she has been in perfect health, no difficulty of any sort, but at present there is not the slightest sign of lymphoid tissue in the tonsil fossa. It looks as though a complete and beautiful enucleation had been performed. Dr. J. H. Wright, pathologist to the Massachusetts General Hos-

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pital, examined specimens from the growth and found it to be a rapidly growing lymphomata.

Dr. William E. Casselberry, Chicago (in closing): The effect of the vaccine upon the spheno-ethmoidal discharge was distinctly favorable. It was not entirely eradicated, but it is now so slight in comparison that the patient estimates it as less than one-eighth of its previous quantity. There has been no further treatment.

With regard to the surgical technique in removal of the growths, the upper ones were snared without a mirror by extreme depression of the tongue with the patient's head directed upward, the growths being held by a vulsellum while the borders were freed to the base of the growth by alternate sharp and dull dissection. The steel wire loop was then adjusted to the base under upward traction with the vulsellum.

The lower ones, those which were removed, were grasped and the snare adjusted under preliminary observation with the mirror, the mirror then being discarded and the wire drawn home regardless of gagging.

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PRIMARY LUPUS OF THE LARYNX.

BY EMIL MAYER, M.D.

Three cases of lupus of the larynx, two of them primary, have been under my care during the past year, recalling the study made of this affection by the writer and presented to the American Laryngological Association at its Nineteenth Annual Congress in 1897.[1] Their histories are subjoined together with a brief resume of the few similar cases that have been recorded in the past seventen years, thus permitting a comparison with the viewpoint then existing, as also of noting the progress made especially in the diagnosis and treatment of this affection.

Case I. L. K., male, aged 44 years, Roumanian by birth, came to my service in the dispensary of Mount Sinai Hospital on April 20, 1913. He gave a history of cough without pain or hoarseness. He claimed to have been well until recently when he had been told that he had tuberculosis. His physician noted a white spot on his tonsil and sent him to me for examination. The white spot proved to be a concretion in the tonsil. The laryngoscope showed a surprising condition of affairs accompanying such a meager history. His epiglottis was one large infiltrated mass with irregular nodules having lost all its original appearance; both arytenoids were infiltrated, there was an infiltrate at the right false cord, and breaking down in various parts. The lungs were examined by Dr. Taschman, who found widespread tuberculosis of the lung, a small cavity at the left apex. His entire absence of distress and the far advanced destruction made the diagnosis of lupus of the larynx in its final stages as the only tenable one. At no time during the after treatment was there appreciable dysphagia or dyspnoea, and he died ten months later of tuberculosis.

Case II. D. W., male, aged 36 years, was admitted to Mount Sinai Hospital, service of Dr. Howard Lilienthal, December 31, 1913. He gave a history of having had a cough four years ago, was treated for four weeks when he recovered. His present illness began seven weeks ago, when he began to have some difficulty in swallowing and hoarseness; his breathing was difficult. Examination showed marked stridor with respirations; no pulmonary disease found.

January 2. Examined by Dr. Mayer: "The entire epiglottis is involved in an enormous mass which extends into and covers almost completely the lumen of the larynx. The arytenoids are

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so swollen and indurated that no view of the interior of the larynx is obtainable. Owing to the extensive obstruction in the larynx, a preliminary tracheotomy is advisable before removal of a portion of the growth for examination." January 2. Wasserman test made by Dr. Kaliski: Negative.

January 3. Tracheotomy performed under local anesthesia by Dr. Lilienthal.

After recovery, on January 19, under cocaine anesthesia, two pieces of tissue were punched out from the epiglottis by the writer, and sent to the pathologist, Dr. Mandlebaum, who reported tuberculosis (lupus).

January 27. The entire protuberating mass of the epiglottis I now removed with punch forceps, under cocaine, with little or no discomfort to the patient, his breathing at once improved and his dysphagia ceased.

On January 30 the tracheotomy tube was removed and on February 3 he was discharged from the hospital.

He attended my service in the dispensary for local treatment thereafter.

Pulmonary examination showed no sign of tuberculosis. This, together with the presence of the enormous mass of slow formation without symptoms until his respirations became impeded, made the diagnosis of primary lupus of the larynx at an advanced stage of the affection indubitable.

Case III. I. H., male, aged 50 years, was seen by myself April 20, 1914, and is of interest here only as a case of secondary lupus, for it is associated with a similar affection in the right upper jaw on the inner surface, in the antrum of Highmore on the right, and in the nose on the same side. The same absence of distressing symptoms, with no pulmonary involvement, in spite of far advanced tumefaction and destruction of the larynx, characterizes this as a case of lupus; and the lesion of the mucous membrane of the mouth bears this out, though we have no means of ascertaining positively whether the larynx was the original site or not.

G. Brat[2] mentions five cases of primary lupus of the larynx which he examined in the clinic of Burger. "The disease begins almost always in the aditus of the larynx, the epiglottis is nearly always affected; the aryepiglottic folds in 45 per

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cent, the interarytenoid region in 42 per cent, while it very rarely affects the subglottic region. Subjective and functional disturbances are often entirely missing and the disease is discovered quite accidentally. Pain, cough, and expectoration are very rare." He says further: "In comparison with other tubercular diseases of the larynx, lupus is entitled to stand alone. Lupus of the larynx compares with lupus vulgaris of the skin; ulcerative tuberculosis of the larynx with similar conditions of the skin; and tubercular laryngeal tumor with scrofuloderma."

F. Massei,[7] in recording a typical case of lupus of the larynx in a girl aged 10, eventuating in tuberculosis, thinks the distinction between lupus of the larynx and tuberculosis should not be made.

J. Durazzo[8] reports a case in a female aged 22.

Oppenheim[9] reports a case in a male aged 28.

Talbot R. Chambers[6] presented a case in a female, aged 21, where he successfully excised the epiglottis.

Thomas J. Harris[1] reports a case in a woman aged 73. This patient had been seen by Jonathan Wright three to four years before Harris saw her, at which time two-thirds of the epiglottis was present, and the diagnosis lay between epithelioma and lupus. Later the epiglottis became totally destroyed.

H. E. Smyth[5] presented a case of this affection in a male, aged 47 years, at the New York Academy of Medicine. This case was examined and discussed by Gleitsmann, Douglas and Mayer.

St. Clair Thomson[4] reports a case in a female aged 22.

In the discussion of an article on lupus of the mucous membrane of the upper air passage by M. Senator,[10] Edmund Meyer (Berlin) stated that he had observed a case of primary lupus of the larynx in a patient whose age and sex is not given.

Dundas Grant[11] mentions a case in a boy aged 10.

Rosenberg[12] reports two cases: One, a female aged 36, a very mild case in which the epiglottis, aryepiglottic fold and false cords were involved, but not the true cords. Spontaneous

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recovery ensued. In the other case, a female, aged 15, a diaphragm was formed in the region of the vocal cords producing hoarseness and great dyspnoea. The conjunctival reaction was negative in both cases.

L. Neufeld [13] found twenty-four cases of primary lupus of the larynx recorded in the literature up to the time of his publication (1908).

He records a case of this affection in a female. There was recent hoarseness. On the laryngeal surface of the epiglottis there were six brownish-red nodules, whitish at their apices; the false cords were indurated and had the same prominence as the epiglottis. For the existing dyspnoea the right false cord was removed, subsequently the left false cord was also removed, and its base treated with lactic acid, with good results eventually.

G. F. Guild [14] mentions a case of this affection in a female aged 43. Tracheotomy followed by thyrotomy and removal of diseased tissue with no recurrence in eight years.

Bornasch [15] (St. Petersburg) reports a case of primary lupus of the larynx, age and sex of patient not given.

E. Baumgarten [16] reports a case of this affection in a female aged 18, in which there were white linear scars on the free border of the epiglottis, nodules on its laryngeal surface as also on the false cords. No tuberculosis was present. Tuberculin caused severe reaction in the larynx. He considers the affection to be a tuberculosis of the mucosa.

Donelan [17] presented to the laryngological section of the Royal Society of Medicine a case of laryngeal tuberculosis which was three years under treatment. Complete rest of voice for two years, forty galvano-cautery applications, guaiacol spray and guaiacol internally were followed by cure. Thomson considered this a case of lupus.

Kilson [18] had a case of a female aged 36, treated successfully with galvano-cautery and internal administrations of arsenic.

J. Safranek [19] presents three cases of primary lupus of the larynx. The first case was a male, 36 years old, slight hoarseness; family history negative. This strong and healthy looking man had an epiglottis thickened in its entirety, mostly how-

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ever, in its center; the border covered with small pink nodules breaking down in places, with a deep redness of the laryngeal surface. The aryepiglottic folds were likewise infiltrated and covered with isolated nodules; false cords infiltrated and some subcordal infiltration. There was no temperature and no involvement elsewhere, the lungs were free. The second case was a male, aged 36, spontaneous recovery. The third case was a female, aged 39, with suspected empyema of the accessory sinuses, lupus of the larynx was quite accidentally discovered.

Forchhammer[20] found 5 per cent of the lupus cases to be laryngeal, but none of those were primary, which latter he considers to be a rare disease. These statistics were obtained after the examination of 1,200 lupus patients in the Finsen-Light Institute, Copenhagen.

J. Dresch[21] believes that the primary focus in lupus of the mouth, pharynx and larynx exists in the nose, while Rosenberg[12] places the laryngeal cases as being esophageal in origin.

Harms[22] says that although Baumgarten and von Dahrung believe that lupus is of hematogenous origin and does not originate from an external infection, most authors believe that the dissemination in the blood vessels is due to an infection from without. This is shown by the fact that in most of the lupus processes the lungs are not primarily affected, and secondly, that the picture of metastatic tuberculosis of the skin differs entirely from that of the mucous membrane. "Primary lupus of the larynx is extraordinarily rare."

Pregnancy has a bad effect on lupus of the mucous membranes, especially of the primary sort. Safranek[19] saw a case of primary lupus of the larynx in a pregnant woman in which edema of the larynx supervened and tracheotomy had to be performed. Recovery was prompt after induced abortion.

To differentiate between lupus and syphilis, the Wassermann reaction being negative, and antisyphilitic treatment with iodides and mercury failing, a hypodermic injection of "old" tuberculin may be given under precautions, however, as laryngeal edema often supervenes upon the tuberculin test.

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The smallest dose, therefore, should be given at first. Lupus occurs more frequently in females than in males.

Treatment. Treatment may be medical or surgical. As local applications lactic acid, caustic potash followed by pyrogallic acid, muriatic acid after spraying with ethyl chloride, and also calomel have been used.

Pfannenstill[22] has made use of the following treatment: The iodide of sodium is given internally in daily doses of two grams, following which inhalations of ozone are made. It is claimed that iodine is thus set free and its powerful bactericidal effect is made use of to good advantage.

Ove Strandberg,[24] followed the method of Pfannenstill, substitutes sprays of hydrogen dioxide acidulated for the ozone inhaler, and claims that much benefit is obtained.

Rudolph Mandl,[25] believing that the iodine is best applied locally, has prepared a powder which is powerfully hygroscopic. It is a hydro iodo borate called Ulsanin. This is applied directly to the diseased part, a brownish stain results as soon as it becomes moist, and hence must be most carefully applied.

Katschanowski[26] suggests the advisability of local applications of permanganate of potash.

Koichi Fujinami[27] (Tokio) presents a new method of treating lupus of the larynx with the parallel rays of the Finsen lamp. A funnel is added to the distal end of the apparatus with water flowing about the mouth end. The patient is seated, tongue protruded, with the funnel introduced in the mouth and set with thumb screw. At first the treatment is given once daily and from three to five minutes' duration. The sittings are increased to fifteen or twenty minutes as soon as the patient becomes accustomed to the discomfort to the tongue. As soon as reaction occurs treatment is interrupted and resumed on disappearance of the reaction. It requires five or six treatments before pain in deglutition, redness and tumefaction occurs; from this time improvement begins.

Albanus[28] recommends the use of the high frequency current. The Finsen light was not used because of the diffi-

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culty of applying the rays to the larynx. Radium has not been sufficiently tried to state its value.

The Roentgen rays, while of enormous benefit in lupus of the mouth and pharynx, is technically difficult in the larynx, and cannot be carried out efficiently, while external application is necessarily less useful.

The treatment with superheated air is followed by brilliant results. With the proper apparatus and the superheated air directed to the part, the bacilli are killed and the lupoid tissue destroyed. To reach the larynx with this a laryngo-fissure should be performed (Safranek[10]).

Operative treatment however, radical removal of diseased parts, followed by galvano cautery and lactic acid is by all means the best form of treatment, and the earlier this is done the better. The suspension laryngoscope of Killian will undoubtedly lend itself in many ways toward the treatment of these parts.

The total number of cases of primary lupus recorded in the literature up to the present time, and including two here presented, is thirty-five, indicating the rarity of this affection, which was first described by Ziemssen in 1876.

It is perhaps noteworthy that the two cases presented by myself in a former communication were of primary lupus of the larynx in their earliest stages, and were observed for many years, one of them being under care for eighteen years, while the two here presented were in the later stages of the disease.

With but one exception each writer who has observed primary lupus of the larynx is strongly in favor of the distinctive appellation of lupus as against tuberculosis. All agree that the similarity is very great; for lupus presents the same reactions after subcutaneous injections of tuberculin, vaccinated animals become tubercular, the tubercle bacilli are produced in pure culture, and injected guinea-pigs become tuberculous. It is very rare for a lupus deposit to become caseous. With this close similarity all other resemblance ceases.

Lupus of the larynx is a chronic disease with but the slightest symptoms, is most frequently an accidental discovery, and the

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prognosis as to life is relatively good. For these reasons therefore we feel that we most cordially endorse the statement that the distinctive appellation of lupus should be maintained, and that primary lupus of the larynx, though rare, does exist.

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Discussion.

Dr. J. Payson Clark, Boston: I had the opportunity recently of seeing an interesting case of lupus of the larynx. I always feel when I see lupus in any form in the throat a sense of helplessness because I have seen lupus advance in spite of any method of treatment I could apply. The case which I saw recently is very interesting; that of a young woman 24 years of age, who was sent to me by a skin specialist. She first discovered somewhat over a year ago a small red spot on the left cheek just about the angle of the mouth; she showed it to a local physician who made light of it, so she forgot it, but last fall it had increased somewhat in size, so she went to a dermatologist in Boston. He was not able to make a diag-

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nosis but kept it under observation until early in February, when he decided it was lupus. Then a little later she was a little hoarse and he thought there might be some lupus of the throat and sent her to me. I discovered on the left side of the posterior wall of the pharynx and involving the left posterior pillar a pale nodular mass which had all the typical appearances of lupus. On examination of the larynx I found the epiglottis swollen, pale and nodular, and this same condition extended down to the aryepiglottic folds, and the arytenoids were somewhat enlarged. This patient was apparently in perfect health, well developed and nourished, with a splendid color; lungs examined and gave no sign of any trouble. What am I going to do with this case? Of course, if this condition existed only in the spot in the pharynx I could curette it and cauterize it thoroughly, but I do not feel that by removing the epiglottis I will cure the trouble, because if you see an epiglottis infiltrated in that manner you will know that the process microscopically has probably extended considerably further, and if you remove the epiglottis you will have no surety of removing the whole disease. Probably the aryepiglottic folds and arytenoids are also affected.

Dr. Mayer's first case seems to me to come more under the head of tuberculosis of the larynx, showing involvement of the lungs with death soon after. I do not know on what ground he based his diagnosis of lupus.

Dr. William E. Casselberry, Chicago: I was about to ask Dr. Mayer if he would not, in closing the discussion, go a little more into detail with respect to the first case. I do not doubt the correctness of his diagnosis, but I feel I would have made a mistake and called it tuberculosis of the larynx. In a man with advanced pulmonary tuberculosis, with cavities, etc., and with involvement of the larynx and nodular enlargement of the epiglottis, even though not accompanied by much pain, I am sure that I have seen just such cases in both advanced and earlier stages which I have included in my lists of cases of tuberculosis of the larynx. We know that there is a clinical distinction between lupus and tuberculosis, both with respect to the skin and the mucous membrane, and doubtless the same individual can have the two conditions combined, as Dr. Mayer infers was the case in his patient, but I think the combination without involvement of the skin must be rare and difficult to substantiate without the diagnostic aid of the more characteristic cutaneous lesions of lupus.

Dr. Henry L. Swain, New Haven: I would like to ask Dr. Mayer what has been the result in these cases of tuberculin

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used along modern methods as is done in cases of tubercular laryngitis? In speaking of the marked benefits from superheated air do you use the suspension laryngoscope?

Dr. Herbert Birkett, Montreal: Some years ago I reported before this society a case of primary lupus of the pharynx, and at the same time mentioned a case of lupus of the nose which only accidentally was found to have involved the larynx. These conditions were definitely found to be lupus, first from the presence of the bacillus, secondly from the local definite reactions to tuberculin, and finally from the transmission of the disease to guinea-pigs. The lungs in both cases were absolutely negative, for the use of tuberculin would have awakened any latent focus had any existed. In spite of local treatment which I had carried out, it resisted treatment until X-ray was used, which was accomplished by means of a lead tube directed into the pharynx and down to the larynx, thus allowing of direct application. Both cases got absolutely well.

Within the past six months I have seen cases of primary lupus of the nose, both of which have made complete recoveries under radium. In one case, the specimen was definitely pronounced by the pathologist to be carcinoma; this was very curious for two specimens were sent to the pathologist at different times, without his knowing they came from the same patient, and he returned the same diagnosis for each.

Dr. Emil Mayer, New York City (in closing): I would like to say, regarding the diagnosis in the first case, that the man was brought to me by his physician, who was a very good observer, with the very thoroughly elicited history of having a complaint of only seven weeks' duration. His story was that over four years ago he had a cough for which he was treated, and then remained well and yet at the time of examination there was this tremendous infiltration and destruction in his larynx, a condition which must have been of very long duration and for which his man had absolutely no complaint. It seemed to me that the case of the absence of all previous bad symptoms, together with the absence of dysphagia and the slow process of this thing, for it was only discovered when the tuberculosis of the lung had become apparent, also because the man had been in such surroundings that his history would have been brought out quite early if he had anything of the sort, for all these reasons it seemed to me only proper to place this case entirely in the catalogue of late appearance of lupus of the larynx beginning in the larynx and eventuating in the lung. Especially as the second case without lung involvement and no greater infiltration and destruction had occurred, I felt

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justified in putting both in the same category. It is possible that this is one of the cases we meet when we investigate cases of arrested tuberculosis. The point has been brought out by Dr. Birkett and Dr. Clark that lupus of the larynx is an accidental discovery. Dr. Clark's case is a beautiful illustration. A woman coming to a good observer who noticed finally that it might be lupus, there being only a slight hoarseness but a great deal of infiltration of the larynx without any lung involvement; examination showed the specimen to contain tubercle bacilli, and other tests proving the condition.

I would say, regarding tuberculin treatment, it has been used extensively, particularly by Blumenthal, Edmund Meyer, etc., and they extol it very much, used carefully and in the manner indicated, the old tuberculin, the new tuberculin not being used because of the danger of edema.

Superheated air is claimed to have good results by laryngoscopic fissure, and it was one of the methods of treatment which Safranek suggested, using the Killian suspensory apparatus.

As regards the helplessness of our treatment, it does seem rather peculiar to speak of treatment of a disease of slow progress, which causes the patient little or no discomfort. As regards any treatment which is instituted, and we may have to go from X-ray, radium, superheated air, or this new method of Pfannenstiel of the direct effect of iodine, the whole endeavor should be to inhibit as far as possible the insidious progress of this disease.

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ENDONASAL OPERATION ON TUMOR OF THE HYPOPHYSIS.—REPORT OF A CASE IN A CHILD NINE YEARS OF AGE.

BY T. H. HALSTED, M.D.

In what was probably his last contribution to medical science, Dr. Roswell Park, in an article in American Medicine in April of this year, made a plea for the collection of facts bearing upon the hypophysis and a cessation for a few years of papers dealing with theories and conclusions regarding the functions and diseases of this organ until such time as the known facts could be collected, digested and analyzed.

The reason for the report of the one case which is being reported in this paper is not simply to record what observations have been made in this case, but the purpose is more particularly to draw your attention to the direct and comparatively safe and not unduly difficult approach to the hypophysis by the endonasal route, my patient being a child under nine years of age.

Hirsch, in Vienna, has for four years been operating by this route, being the first to suggest this approach and demonstrate its feasibility on a living patient.

Cushing, in this country, does very much the same operation, with, however, the important exception that in doing his resection of the nasal septum, through which he passes on to the hypophysis, his initial incision is under the upper lip, not entering at all the nasal cavities but passing between the two layers of the septum to the sphenoid. Hirsch, on the other hand, does the Killian submucous resection, his initial incision being in the nose. Cushing's operation is done under general anaesthesia, whereas Hirsch does his under local. Both have had now a large experience. Hirsch has the best statistics of any operator on the hypophysis. Dr. Lewis A. Coffin, in two recent cases, modified Hirsch's operation, as suggested by West some years ago, by removing the posterior half of the septum, bone and mucous membrane, so approaching the sphenoid, without doing a submucous resection at all, the

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claim being that a better field for approach was afforded than by working between the two flaps of the septum.

Case 1. Mary Zollo, an Italian girl of 9 years, was referred to me on Feb. 6, 1914, by Dr. J. R. Wiseman, with the diagnosis of a tumor of the hypophysis, and with the request that operative interference be considered, and if thought best, done.

The child was remarkably clear mentally, being much above the average child of her age in mentality and might be said to be brilliant. Her answers were clear and definite. She is the oldest but one of seven children, six living. Until six months ago she had been well, with the exception of measles at four years and scarlet fever at five, attending school regularly, but about six months before this history was given she became "very nervous," as manifested by a trembling of the hands, some difficulty in walking, gait becoming unsteady and frequent dizzy spells. Headache, frontal, came on about every other night, lasting until she fell asleep. Her sight was impaired. She feels cold all the time and tires very easily. She had always been a large child from birth, but an increase in fat had been very marked for the past few months. She is very large for her age, adiposity very marked, dark complexion with a reddish glow in her cheeks, skin dry and harsh, hair black, dry and coarse, and growing low on forehead and far anteriorly at the sides of the forehead. Eyes are large, brown, pupils dilated. Marked ataxia with intention tremor. Has difficulty in standing with feet together, whether eyes closed or open, and extreme difficulty in making co-ordinated movements, such as touching finger tips together, etc.

Dr. Wiseman had been consulted first a month ago and made a very careful study of the case. He found a Wasserman negative and no improvement followed the use of the iodides. She gained three pounds in weight during past three weeks, and has a very large appetite. An increased tolerance for sugar, no glycosuria after 200 grammes glucose, urine otherwise negative. Slight pyrexia (about 100 deg. F. per rectum). Under his directions the eyes were examined by Dr. Foster, who reported a double optic neuro retinitis.

An X-ray examination was made by Dr. C. E. Coon, who reported on Jan. 19, 1914, as follows:

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Jan. 19, 1914. Stereoscopic plates—both right and left lateral. Four plates, all of them show sella turcica somewhat larger than the average normal at this age. The bony outlines are irregular and not as clear cut, well-defined margins as other areas in this vicinity. Above and posterior to sella is a brain area of lessened density which is fairly well defined. Antero-posterior diameter one and one half inches, and up and down about one inch. This area seems to surround the sella turcica and the interpretation seems to be a soft growth, possibly a cyst, surrounding and pressing upon the pituitary body.

With a diagnosis of tumor of the hypophysis the patient was referred to me by Dr. Wiseman for the purpose of possible surgical intervention.

An examination of the nose and throat revealed a large, rather flat nose with good sized nostrils, a slight deviation of the septum to the right, moderate adenoids and tonsils somewhat enlarged.

The patient came to my office several times, and on March 5, 1914, entered the Women's and Children's Hospital, where she was studied and observed for several weeks by several members of the staff.

Several additional X-ray examinations were made by Dr. Coon, but with no additional facts discovered than set forth in his preceding report, heretofore referred to.

The ophthalmological report by Dr. F. W. Marlow is as follows:

Vision, 69+each eye; sight appears to be occasionally obscured; fields normal for form in each eye; color fields ditto (but difficult to take on account of the variable fixation); apparently no interlacing. Pupils somewhat large except in very bright light, when they are about of normal size; in dark room they show no reaction at all to light, but in a very bright light a moderate change; reaction with convergence is normal. The muscle balance is normal.

Examination of the eyes is very strongly suggestive of gross intracranial disease, probably tumor. Nothing in the eye examination suggests hypophyseal disease. The only phenomenon which can be regarded as throwing any light upon the localization being the defective reaction of the pupils to light;

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i. e., compared with the visual acuity, which may possibly indicate a lesion of the corpora quadrigemina; this faulty reaction may, however, be due to lowering of the conductivity of the fibres in the inflamed nerves.

Dr. H. G. Locke, one of the neurologists of the hospital, reported:

Patient is short, thick set for her age, with a tendency to fatty overgrowth, particularly about the abdomen and hips; facial expression somewhat flat and ironed out, with little play of the muscles on emotional fluctuations; well marked general ataxia of partial cerebellar type; marked choreiform movements; well marked athetosis; paralysis of the pupil; deep and superficial reflexes not materially altered; deafness present, but not persistent. Added to the atheto-choreiform movements is a decided intention tremor.

Conclusions: The symptom-complex would place the lesion in the interpeduncular space; the iridoplegia, deafness and the ataxia of partial cerebellar type, may be located in the corpora quadrigemina; the atheto-choreic and intention tremor involve the optic thalamus, which is also involved in the disturbance of the psychic reflexes. There is probably some pressure also upon the cerebellar peduncles. The tissue and nutritional changes are referable to the pituitary body.

Diagnosis: Cyst of the pituitary body, with pressure on the optic thalamus and corpora quadrigemina and all regions contiguous to or forming the interpeduncular space.

All were agreed that the case was one of tumor involving the hypophysis, but whether by pressure alone, a neighborhood tumor, or one of the hypophysis itself, there was doubt. The preponderance of opinion was that the tumor was a cyst and that it should be operated.

I decided on following Hirsch's endonasal method of operating in two or three stages and under a local anaesthetic if at all possible, the age of the child, nine years, presenting the only obstacle to the use of local anaesthesia. The child's unusual intelligence, strength of will, and desire to be rid of the tumor whose presence she understood and appreciated, would be of great assistance to me, I felt sure. My judgment proved sound in this respect when she was put to the test in the operating chair, as I never operated on a child under local anesthesia with greater comfort both to myself and the patient. Urotro-

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pin, five grains every four hours, was given for a week or more prior to each of the three operations.

First operation, March 23, 1914: Local anesthetic, cocaine 5 per cent with 1-2000 adrenalin was applied with cotton pledgets to the middle turbinate regions of both sides and remained fifteen minutes. Patient in upright position. The left middle turbinate removed in its entirety. Right middle turbinate removed and the anterior and posterior ethmoidal cells of same side exenterated. So much was removed in order to give me plenty of room for the second operation when the pituitary was to be attacked and which I thought was necessary. It would have been sufficient, I think, had I left the turbinate of one side. There was no pain at any moment and no hemorrhange, the patient leaving the table satisfied to have the next operation as soon as I was ready. Five days after this operation the temperature 100 deg. F., she complained of dizziness, fell forward twice while walking, was quite confused and excited, and movements more inco-ordinated. Complained of pain in cervical region, some muttering delerium, hallucinations of sight, intention tremor more marked, cried out great deal in shrieks, temperature reaching 102 deg. F. These symptoms of meningeal irritation gradually subsided within the next few days so that by March 31 (eight days after operation), she was back to the condition preceding operation. Urotropin had been given throughout.

Second operation: On April 4, 1914, twelve days after first operation, patient in upright position. Under 5 per cent. cocaine and 1-2000 adrenalin, a submucous resection of the septum was done, the anterior incision beginning on the right side well back in the triangular cartilage. All the cartilaginous and bony septum posterior to this was removed, including the vomer and perpendicular plate of the ethmoid up to and including the rostrum of the sphenoid. The mucous membrane of the anterior wall of sphenoid on both sides was submucously elevated, exposing the whole of the anterior wall of the sphenoid, which was removed, Hirsch's modification of Hajek's instruments being used. The sphenoidal septum was then removed and the posterior wall of the sphenoid with the sella

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turcica was now in clear view. There had been no pain and the hemorrhage was slight. A small Jackson lamp from the direct laryngoscope, introduced through one nostril while working on the other, gave valuable aid in illumination. There was not the pronounced convexity of the posterior sphenoidal wall, marking the hypophyseal eminence that was expected to be found, and give the positive indication for the site of removal of the bone of the sella turcica beyond which would be found the pituitary tumor. The long Hirsch chisel was introduced at what seemed the proper site and was sunk so deeply into the bone by the mallet that I felt the chisel must be in the body of the sphenoid instead of the sella. A number of attempts were made but the bone seemed too dense and too thick to be the sella, and because of the uncertainty of location, and the necessity of being right, I decided to desist, and to adopt a method employed by Cushing in a similar situation where he became confused as to his location. A small piece of a lead plate less than a quarter inch square, enveloped in thin iodoform gauze with a long piece of silk thread tied about it, was carried through the wound and placed at the point where I believed the sella should be opened.

The whole wound was then packed with bismuth gauze and the patient sent to the ward. The time occupied was two hours. There was very little complaint of pain and the hemorrhage was not troublesome. The next day a radiagraph was made to determine the location of the lead plate and its relation to the sella turcica. The radiograph showed that while I was in a safe position for opening the sella, a better site was one-eighth inch higher. The gauze and packing were removed the day following the operation, but the discharge and swelling were too great to make it safe to operate at once, as had been intended following the X-ray to locate the lead plate. On the fourth day the patient became quite drowsy, stupid, confused and developed hallucinations of sight, seeing people and elephants, shrieked a great deal, but complained of little pain. A traumatic oedema with irritations of the meninges apparently occurred. A week after the operation a tonsillitis with temperature to 103 deg. F. developed and subsided in a

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few days. Urotropin was given throughout. On April 23, nineteen days after the second operation, the patient's condition, both general and local, had sufficiently improved to make it safe to undertake the last stage of the series of operations.

Third operation: Patient in upright position. Cocaine with adrenalin local anesthesia. The two walls of the nasal septum had completely united but the sphenoid was wide open, the anterior walls of both sides being gone. The posterior third of the soft boneless septum was then removed, giving free access to the posterior sphenoidal wall and the sella turcica in the median line. Using Hirsch's chisel and his sella forceps and hooks and right angled spuds, the bony sella was removed, exposing the bluish dura or cyst wall. This was then incised with the long bistoury of Hirsch, when there was an immediate gush of a half an ounce or more of limpid yellowish fluid. Unfortunately, this was not collected for examination. No packing was inserted in wound or nose. This operation lasted about half an hour and the child left the operating room in good condition. It was observed within a few minutes of liberating the fluid from the cyst that the pupils, which previously were widely dilated, became contracted.

During the week following this last operation there was quite a marked change in her condition. During the night and sometimes during the day time, she would cry out with a sharp shriek, complained more than before of frontal headache, was slow in responding to questions, and in a stuporous condition a good deal of the time, listless, dull, apathetic, involuntary urination, polyuria. During night of April 28, five days after operation, had two tonic convulsions, lasting seven and five minutes; pulse irregular and thready, respiration slow and labored and of Cheyne-Stokes type. These were the only convulsions, and following them there began a gradual improvement, the ataxia and athenoid movements becoming markedly less, the pupils contracting, but she continued for two weeks very irritable with a marked change in her disposition, speech becoming rough in tone and words, at times profane, very different from her earlier speech which was always polite. The loss in weight was very perceptible, while there

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was a steady loss in muscular strength and tone, the child being now confined to bed and unable to stand alone. Involuntary micturition and defecation. There occurred a very marked change in the symptoms since her entrance to the hospital, which might be attribted to the progress of the disease in the pituitary body itself, together with the lessening of the inter-peduncular pressure on the surrounding neighborhood parts due to evacuation of the cyst.

From being exceedingly bright and talkative she became the exact reverse, seldom speaking, apathetic and listless. Muscular fatigue was greatly increased so that she could hardly hold up her head or her arms. She has lost in weight though there is still decided adiposity. Urination and defecation are involuntary, due perhaps to a lack of care, a condition of stupidity combined with muscular weakness. Headache is much less complained of. The ataxia is diminished. A remarkable change in the color of her hair has taken place. From being black, within four weeks it became a decided reddish brown at distal end of the braid, while that within six inches of the scalp is also changing rapidly to a reddish brown.

The examination of the eyes shows: "Periphery of field apparently normal in all directions, possibly slight contraction. Pupils moderately large, slight reaction to very bright illumination. Pupils vary in size, sometimes widely dilated, left more than right. Double optic neuritis. Vessels seen with +4'D right and with +6'D left. Haze becoming lighter in color. Ocular movements normal. Pupils equal. Reaction of pupils with convergence normal. Optic neuritis simply shows later stage. No progress of optic neuritis."

—Dr. F. W. Marlow.

From a state of hyperpituitarism, a condition seemingly present when she entered the hospital, there is now apparently a condition of hypopituitarism. The pressure symptoms due to the cyst are seemingly improved, as evidenced by the lessened headache, ataxia and improved eye symptoms.

To make up for the lessened secretion of the hypophysis she was put on pituitary extract ten days ago and already there has occurred a most striking change in her condition. Her muscular and body fatigue, which had become so great

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that she could not hold her head up in bed, has improved so much within these past few days that she sits up now a wheel chair an hour at a time and can take a few steps alone. There has been as great an improvement and awakening in her mental state. She is now cheerful, talkative, sings a great deal and is becoming interested in her surroundings, and we are hopeful that she will soon be as bright mentally as she was when she entered the hospital.

It is, of course, possible that the cyst may fill up and give rise to pressure symptoms again, but as yet there is no evidence of its having taken place.

The further progress of the case will be reported later.

Discussion.

Dr. D. Bryson Delavan, of New York: I have listened to Dr. Halsted's valuable paper with great interest, and regret that Dr. Joseph H. Bryan is not present to share in the discussion. I have seen a case of Dr. Bryan's a lady of middle age, who has required many operations, extending over a long period of time, for the relief of persistent and wide-spread diseases of the sinuses. The sinus conditions have been relieved, but general symptoms, new in character, have presented themselves, and the patient's condition has become critical. The diagnosis of "failure of action" of the pituitary body has been made, pituitary extract has been administered and the patient has made a brilliant recovery.

Dr. Lewis A. Coffin, New York City: I have operated on two of these cases, having done practically the same operation that Dr. Halsted has reported, excepting that I cut away the posterior part of the septum, without having done a submucous resection. I took out the rostrum and got to the sphenoidal wall by so doing. Both cases were done in two or three stages.

The first case was a woman, an idiot, who was referred to me from a charity hospital. She was a poor patient under cocaine, because she had no mentality, but I was successful in getting back as far as the sphenoid. After having opened her sella, she was much improved as to pain in the head, but her mentality was not. Some ten days after I had done the operation I felt more or less chagrined because I had not obtained any of the tumor for examination. I knew it was a cyst, there

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having been a gush of straw-colored fluid as the tumor was punctured. It had become so easy to go into the sella turcica that I thought by using a curved forceps I might get some of the tumor wall. Under general anesthetic, using one of Yankauer's forceps somewhat curved, I entered the cella, closed my forceps, and took out what I hoped was a portion of the tumor wall; there followed a slight oozing hemorrhage. I packed into the opening in the sella. Two hours later the patient was comatose, evidently from brain pressure. I removed the packing, but she died that night.

Another case was sent to me from the eye clinic of the Manhattan, a young girl of seventeen, who had complete blindness in one eye and temporal hemianopsia in the other, with extreme and constant headache. Under cocaine anesthesia I removed the posterior half of the septum, opened the sphenoid, and took down the sphenoidal septum. I then slipped a curved periosteal elevator into the sphenoid, without light, and holding it in position with adhesive plaster, had an X-ray picture taken of her head. I found the periosteal elevator infringed on the sella wall, exactly where I wanted to enter it. The sella wall having been opened one could see the tumor very well indeed, but I could not, by such effort as I made, get any tissue. It seemed to break down and crumble. Before she was taken from the table a currette was entered through the sella opening, held in position by adhesive plaster and an X-ray picture taken. The currette was shown to be in the middle of the pituitary gland. This girl improved very much, not in vision, but her headaches disappeared, at least as long as her digestion and bowels were carefully looked after, but her family were disappointed because of the lack of improvement in vision and they began visiting one doctor after another. Dr. William Sharp, who is consulting neurologist to our hospital, said we were not warranted in doing anything further for her, unless her headaches returned, in which event we contemplated doing the Frazier operation, but she left me and consulted Dr. Elsberg, who kindly notified me and intimated that he might decide to do a Frazier decompression. I asked him if he did operate on her to allow me to witness the operation. Some two weeks later he notified me that he was going to operate, and kindly invited me to be present. His wonderful and beautiful technique was inspiring, but he removed a piece no greater than a grain of rice from the tumor, which of itself, of course, has no influence.

The Frazier operation is bound to give relief from pressure for a certain length of time; the floor of the brain cavity is cut away and a large bone flap conduces to relief from pres-

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sure until healing takes place. What relief there is from the transphenoidal decompression on the other hand is permanent. Many of these tumors are cystic, and I think can be better opened through the sella wall.

One word in regard to the criticism of those who do the Frazier operation. They say the intranasal operation is dangerous on account of sepsis. In neither of the cases I have done has there been a suggestion of sepsis. In fact, I think there is less chance of sepsis by this than by the Frazier method. If you will consider the direction of the current of air as it is taken to and from the lung, and then consider the location of the sella turcica in relation to this stream of air, you will see that there must be a negative pressure in the sphenoidal region at all times. There is no chance of sepsis in a perfectly conducted operation.

I have lately seen the case operated on by Dr. Elsberg. There is no improvement and the left eye from which the bony roof was taken is pushed downward and forward.

I would like to ask Dr. Halsted, who operated by Dr. Hirsch's method, to the extent of uncovering the sphenoidal wall and later was obliged to cut out the posterior third of the septum, how he found the field of operation previous to the cutting out of the septum, compared with the field after the posterior part of the septum had been cut away.

Dr. Cornelius G. Coakley, New York City: I have had the good fortune to see four or five cases where the radiographs showed undoubted tumor of the sella turcica, but they have all been in people of considerable means, who have gone to Dr. Cushing for operation, and I am still looking for a case to operate upon.

I saw one case operated on of a man who was totally blind in the left eye, with hemianopsia on the opposite side. Elsberg did the operation, a decompression, but a decompression above the optic nerves. If one is to do a decompression for a growth below the optic nerve, pushing the nerves upward, a subsphenoidal decompression is, I believe, of far more value than decompressing the lower portion of the floor of the frontal lobe. The Frazier operation would seem not so satisfactory as the Hirsch or Cushing.

Dr. Henry L. Swain, New Haven: I have seen and assisted at an operation for pituitary tumor in the hands of a general surgeon. I was impressed by the smallness of the view of the tumor mass. The operation was done skilfully; the nose was cut loose from the face and turned up on the forehead, the septum taken away, the sphenoid opened, the septum be-

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tween the two sphenoidal sinuses removed, and a good operative field was cleared up. When all is considered, the arrangement of the light in surgical amphitheatres is not such that one can obtain a clear view of the further wall of the sphenoid to enable one readily to open into the sella turcica. And yet the first stroke of the chisel opened into the sella turcica and enough was later chipped out to enable us to look through into the cranial cavity. There was a growth presenting, not a cyst, but of organized tissue, and it was supposed to be a glioma, although this would be very rare in this situation. Quite a mass was removed in small bits. There was immediate improvement in vision after the operation, but on the night of the second day she developed a combination of edema of the brain, with pressure, a rise of temperature, edema of the lung, and cessation of the kidney function, and the patient died. During the first twenty-four hours, while still in possession of her faculties, there was a marked improvement in vision, I presume as a result of simple decompression, because I doubt if the mass of tumor taken away in itself was sufficient to have relieved the pressure.

Dr. Thomas H. Halsted, Syracuse, N. Y. (in closing): In answer to Dr. Coffin's question I think the field was better after the taking off of the posterior end of the septum. At first I thought of doing what he had done, not the submucous resection, but the excision of the posterior third of the septum. However, I decided to do the Hirsch operation as being a more tried procedure. I am sure, however, that the field which I got the third time, when I took off the posterior end of the septum, was better than at the second operation.

I do not know regarding the comparative possibility of sepsis.

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A CASE OF PAPILLOMA OF THE LARYNX TREATED BY RADIUM.

BY F. E. HOPKINS, M.D.

The subject of papilloma of the larynx in children was thoroughly discussed by this association in 1905. Dr. Clark's exhaustive paper grew out of a large experience with these most serious cases, and his conclusions furnish a prudent and intelligent basis for the care of this disease in children. Notwithstanding the peril to life from suffocation and the tendency to rapid recurrence after removal, the natural history of the development of these growths is such that a measurably favorable prognosis is warranted. This favorable element is due to the fact that when the period of the child's active growth has passed, the papilloma may disappear spontaneously, or no longer recur after thorough removal, and Dr. Clark states briefly and positively that the best method of treatment is tracheotomy and non-interference with the growth.

Now the case of the adult suffering from papilloma of the larynx may be far more desperate than that of the child, for he can look forward to no period of cessation of activity in the development of these cells, and rapid recurrence may be the rule. The grim, persistent and unchanging course sometimes run is illustrated in a case reported by Dr. Robert Abbe in the "Medical Record" of April 13, 1912. This case had been under the care of Dr. W. L. Culbert, of New York, who with cutting forceps had repeatedly cleared the woman's larynx of masses of papillomata. This case was a legacy to him from Dr. Lincoln, who had done the same, and who only continued to do what had been done by Dr. Elsberg—surely this patient was wise in her choice of laryngologists. The picture of this larynx stuffed with warty growths was published by Dr. Elsberg in his report of the case appearing in the transactions of the American Medical Association for 1865.

Bringing the history of the case down to 1912, as noted above, the patient's larynx had been cleared out every six months for over forty-seven years—a comment on the tendency,

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or lack of it, of these warty growths to take on malignancy when repeatedly operated upon.

A case similar in character though less severe in degree is that of Mrs. C., fifty years of age, who recently came under my observation through the courtesy of Dr. J. L. Barton, of New York. Mrs. C. was operated upon for the removal of papilloma of the larynx seventeen years ago. Tracheotomy was done at that time and an ounce of papillomatous tissue removed. She has been operated upon repeatedly since and the snare, forceps, curette, actual cautery and mono-chlor acetic acid have all been used. Tracheotomy has been performed seven times during this period of seventeen years.

These obstinate cases are referred to as illustrating the serious problem that some of them present and because both of these have recently been treated by radium. Mrs. C.'s treatment was by Dr. Abbe on December 23, 1913. Dr. Abbe also treated the first named case. A tracheotomy was done under ether and radium applied directly to the larynx for a period of forty-five minutes. The growths disappeared and the tracheotomy wound was allowed to close at once, and for a time breathing through the larynx went on reasonably well. Narrowing, however, occurred and to such a degree that tracheotomy again became necessary and was done April 5. At this time no growths could be seen in the larynx, its narrowing being due to adhesions through the anterior three-fourths. In fact, the opening remaining was so small it seemed incredible that sufficient air to sustain life could pass. An explanation of this cicatrical contraction which has been offered is that former treatment by acids, cautery, etc., is responsible. At this date a narrow ring of grayish growths can be seen on the under side of the opening in the larynx—a recurrence of the papillomata—and the adhesions within the larynx may be due to burns by radium. If this latter is chargeable to radium then caution must be exercised in its use, and the recurrence shows the need of repeated applications.

Those who have used radium are claiming that a cure of papillomata of the larynx can be effected by its use. If this happy result may be reached, and by a method which does not

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injure the larynx, a boon will be conferred alike on patient and on surgeon. I offer this brief note hoping your discussion may help to make clear the possibilities of the new agent. Is it to bring about a cure, or like the uncertainty of surgery, give but temporary relief, and is it also capable of doing damage to the larynx itself by burning and subsequent cicatricial contraction?

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A CASE OF SEPTIC INFECTION OF THE PAROTID GLANDS RESULTING FATALLY.

BY F. E. HOPKINS, M.D.,

Lesions about the mouth are so often brought to the attention of the laryngologist that a brief report of what must be a rare case of this character is worthy of record. The parotid glands, because of their size, importance and anatomical relation to nerves and large blood vessels, afford possibilities of serious complications, and a case of infection of these glands is the subject of this report.

A review of some of these relations to other structures makes for a clearer understanding of the results which may follow serious lesions of the parotid. The gland has three large lobes; the third or most deeply placed passes behind the styloid process, and beneath the mastoid process and sterno-mastoid muscle, coming in contact with the internal jugular vein and the internal carotid artery. From the relation which this carotid lobe holds to the internal jugular vein it follows that swelling of the gland may cause passive congestion of the brain by compression of that vein. The following structures are found to traverse or to be in intimate relation with the gland: the facial nerve, the temporo-maxillary, superficial temporal, internal maxillary and posterior auricular veins; the commencement of the external jugular vein; the external carotid artery which supplies branches to the gland and divides into its two terminal branches—the temporal and internal maxillary arteries, and the terminal part of the great auricular nerve. The posterior auricular branch of the external carotid artery and the transverse facial branch of the temporal artery arise within the substance of the gland. The gland is separated from large vessels and from the pneumogastric, glosso-pharyngeal and hypo-glossal nerves by a thin layer of fascia.

This quotation from anatomical authority illustrates the difficulty of complete removal of the gland, or even of thorough incision to secure complete drainage in case of septic infection. The structure of the salivary glands, too, explains something

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of the difficulty met with in an attempt to drain by incision, in case of closure of the intralobular ducts, for the salivary glands are of the compound tubular variety, made up of lobules, each lobule consisting of the branchings of a subdivision of the main duct.

Now, in a case of involvement of the entire gland, if we consider each of the great number of the intralobular ducts as occluded by an exudate, the problem of securing perfect drainage is seen to be a difficult one.

Through the courtesy of Dr. Goodell, of Springfield, who was about to leave for his Summer vacation, I saw on July 1, 1913, B., male, 54 years old, who was suffering from an infection of both parotid glands. The cause, or why the development should start as a symmetrical one is not clear and was probably due to some unusual sepsis.

There was but slight rise of temperature and little acceleration of the pulse; though worn to the point of exhaustion by heavy business cares, he kept himself at work, complaining principally of symptoms due to obstruction of Steno's duct, of the great, unsightly swellings at the angles of the jaws, and of mental heaviness and depression. Dr. Goodell had succeeded in probing the duct of the left parotid, and this gland was less swollen than the right, the duct of which had not been entered.

After several trials I succeeded in passing a probe through the right duct down to the gland, and a few drops of thick muco-pus drained away, but the inflammatory process in alveoli and ducts had evidently continued too long to permit of adequate drainage through the duct. Imperfect as was the drainage gained by probing, the slight easing of pressure brought a measure of relief. The patient was prevailed upon to drop his business and enter a hospital, and though there were intervals of temporary improvement corresponding to the measure of drainage secured—on the whole the case did badly. The temperature rose to 102 at night, with morning remissions, but this mild curve did not correspond to the gravity of the process going on.

On July 18, Dr. Dudley Carleton, a surgeon, saw the case in

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consultation with the family physician and myself, and in an effort for better drainage made deep incisions into both glands. From the tense tumor a free flow of fluid might have been expected, but there was only a moderate discharge of thick mucopus exuding from those lobules entered and no dimunition of the general swelling. These incisions proved as ineffective as a means of drainage as had probing the ducts. Why these limited incisions failed is seen by recalling the anatomy of the gland, and the pathology of the process taking place—the many lobules opened were, in fact, but a small fraction of the entire gland, and the great majority of the lobules still remained undrained because of the closure of their ducts.

Some of the patient's symptoms—particularly the mental heaviness and depression—seemed to confirm the suggestion presented in the anatomical relation of the gland to the internal jugular vein, the great swelling of the gland compressing this vessel and causing cerebral congestion. The mental symptoms certainly were not due to sepsis.

The patient died of exhaustion July 30.

If a lesson as to the care of septic infection of the parotid gland is to be drawn from this case, the first suggestion is for early attempts to drain by dilation of the duct, together with efforts to reduce the inflammation of the gland. If such care can begin before the intralobular ducts are closed the outcome should be favorable. This failing, the glands may be dissected out by a skilful surgeon, and while facial paralysis and much inconvenience from loss of the secretion of the gland must result, the best interests of the patient will be conserved.

Discussion.

Dr. Henry L. Swain, New Haven: Dr. Abbe stated in New Haven recently, in speaking of the treatment of tumors by radium, that he had one case without recurrence after five years. It has occurred to me since I have been using suspension laryngoscopy that we have in it an admirable method of exposing these papillomata over long periods to radium. The patient is hung up under an anesthetic, and can be kept so comfortably for so long a period that we could radiate them at our pleasure. Dr. Mayer has exhibited patients under sus-

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pension laryngoscopy. The other day I had a case hung up for nearly an hour under insufflation anaesthesia through the nose, breathing perfectly and without any after discomfort.

Dr. D. Bryson Delavan, New York City: I have seen several of the cases of Dr. Robert Abbe treated by him with radium. In the main the results have been extremely good. As the reader of the paper has suggested, however, sufficient time has not elapsed to demonstrate the final value of this method. Thus far it seems an admirable addition to our armementarium. Radium is especially applicable to superficial growths. Papillomata of the larynx are frequently of this class and should, therefore, be particularly susceptible to relief from the use of radium.

I am interested in Dr. Swain's suggestion as to the method of applying the radium. I have been trying to devise some adaptation of the O'Dwyer tube for the application of radium to such cases but I have not yet succeeded. Without some such help it is practically impossible to make an exposure of the radium for sufficient time to answer the purpose. I have had under observation for six or seven years a case of Dr. Abbe's, whom I first saw with him when she was about five years of age. The case is one of inveterate papilloma, in which radium has not been as effective as in other cases, and I would particularly refer to one result, probably from influences due to the growth itself, namely, a marked contraction, especially of the base of the epiglottis, which is worthy of attention.

With regard to the case of Dr. Lincoln's and Dr. Elsberg's, I have often seen this woman. It is interesting to know that after such a number of years have elapsed and so much traumatism has been permitted the character of the growth has remained unchanged. It has been held very strongly by some authorities that the character of growths never changes, *i. e.*, that the neoplasm is either a papilloma and remains such, or a malignant growth from the beginning. The trouble is that in making a diagnosis it often happens that the fragment secured for examination is from the surface or near the surface, and does not include the deeper parts of the tumor.

Dr. Frederick E. Hopkins, Springfield, Mass. (in closing): Since writing the report on the case of papilloma of the larynx I have had an interview with Dr. Robert Abbe, to whose courtesy I am greatly indebted, and his experience with the use of radium in these cases, covering a period of more than ten years, warrants a positive opinion as to its efficacy in the cure of papilloma of the larynx. Papilloma is a non-malignant superficial growth, the type which radium might be expected to

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influence, and experience has justified this expectation. A considerable number of cases cured are already to be placed to the credit of radium, and while more than a single application may be necessary this is but a detail in treatment. The case referred to, with a history covering a period of forty-seven years, with a great number of operations, was cured by radium. The patient died of pneumonia three years after treatment but there had been no recurrence of the growth and she had breathed comfortably during this period.

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1.—A CASE OF SUPPURATIVE THYROIDITIS WITH PERFORATION OF THE TRACHEA. 2.—AN UNUSUAL INFECTION OF THE EPIGLOTTIS AND LARYNX IN A CHILD. TRACHEOTOMY. RECOVERY.

BY CLEMENT F. THEISEN, M.D.

The first case is that of an Italian, aged 35 years. The following incomplete history was obtained from his wife with the aid of an interpreter. He was first seen by the writer last November. About two weeks before that he developed a sore throat, and for several days had been spitting pus and blood. An examination of the throat at this time showed the following conditions: Both tonsils inflamed and enlarged. Slightly below and behind the right tonsil there was a discharge of pus, with an opening leading up behind the tonsil, from which pus could be squeezed out. It looked like an atypical quinsy, that had ruptured spontaneously, and at an unusual place. The patient had lost a good deal of weight, as he had not been able to take much nourishment for nearly two weeks. A wash was prescribed for the throat, and the family was told to send for the writer if the patient did not improve. Nothing was heard from the patient for nearly two weeks, when the writer received a hurry call. On arriving at the house the patient was found sitting up in bed, breathing with difficulty. In the two weeks that had elapsed he had become greatly emaciated, and had been coughing up pus and blood almost constantly. With the aid of an interpreter we discovered that he had been in a hospital and had been treated with electricity! At this time there was a tremendous board-like infiltration and swelling of the entire front of the neck, particularly involving the thyroid gland, with a good deal of reddening of the skin. On deep palpation of the right lobe, which seemed to be most inflamed and swollen, we thought we got a feeling of slight fluctuation. Pressure at this point at once increased the cough and expectoration of pus. A diagnosis of probable suppurative thyroiditis was made, and the patient sent to St. Peter's Hospital, where the operation was per-

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formed the next morning. An incision into the right thyroid lobe entered an abscess cavity, and there was an immediate escape of air. It was found that there was an opening into the trachea almost large enough to admit the tip of the little finger. The patient got on fairly well for a week or ten days, although he constantly lost weight, when he insisted on going home, where he died a few days later. There had been a constant profuse discharge of pus from the wound. This was examined for tubercle bacilli but none were found. Cultures from the throat and also from the wound showed streptococci and staphylococci. No autopsy was permitted.

The primary seat of infection in this case was undoubtedly the abscess in the tissue back of the tonsil which had ruptured before the writer had been called in.

The rapid emaciation suggested a tuberculous proces, but no bacilli were found in several examinations of the sputum, nor in the pus. The lungs were also negative.

So far as the writer is concerned, this is a unique case.

The second case, an unusual infection of the epiglottis, is that of a boy twelve years old, who was seen by the writer early last May. I was asked to see him by the family physician at his home in the country, a few miles from Albany. The boy had had measles a month before and for a few days had complained of a very slight sore throat. When the throat was examined about four o'clock in the afternoon of May 6 the only thing noticed in the pharynx was a slight redness of the mucosa. Tonsils were not inflamed. There was some trouble in breathing at this time, patient not being able to lie flat. When a laryngeal mirror was used the epiglottis was seen to be tremendously oadematous and inflamed. Several incisions were made at once, and a culture taken directly from the epiglottis. An iced spray was ordered with ice in the mouth, and an ice-coil around the neck. Temperature at this time was 103 deg. F. At six o'clock the same day the boy's breathing was worse, and at seven we again went to the patient's home. He was sitting up in bed breathing with extreme difficulty, and an immediate tracheotomy was performed. This relieved the breathing at once, and the boy

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made an uninterrupted recovery, but it was over a week before his temperature was normal, and there was a good deal of swelling of the glands of the neck.

The cultures taken from the epiglottis after scarification, and others taken through the tracheal canula, showed some staphylococci and streptococci. No diphtheria bacilli could be found. He was given an injection of anti-streptococcic serum. The temperature which remained high for a week slowly subsided, and the swelling of the glands of the neck also slowly disappeared. When the swelling of the epiglottis subsided sufficiently, so that a view of the larynx could be obtained, some edema of the arytenoid mucosa was still present. This must have been considerable during the height of the attack, as suffocation was imminent just before the tracheotomy was performed. This condition was undoubtedly one of the curious infections of the epiglottis occasionally seen with a practically normal pharynx.

The writer has been of the opinion that such cases of acute infection, with edema of the lingual surface of the epiglottis, the edema being mainly limited to this surface, were distinct pathological conditions belonging in a classification of their own. Several cases of this kind were reported in 1900. (Theisen, Albany Medical Annals, July, 1900.)

An experience with several cases this winter, besides the one that is the subject of this paper, and including one of abscess of the lateral column of the pharynx, in which the edema extended first to the lymphoid tissue at the base of the tongue and then to the epiglottis, has somewhat changed the writer's views in this respect, and has led him to believe that Semon's views still hold good.

Swain (Trans. of the Amer. Laryngol. Assoc., 1913), in a very instructive paper on inflammation of the lateral columns of the pharynx, reports several interesting cases. In one in particular, when he was able to make a thorough examination of the patient's throat, after the rupture of an unsuspected abscess of the lingual tonsil, a subsiding swelling of the epiglottis and ary-epiglottic fold could be seen.

Cases of inflammation of the lateral pharyngeal columns

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either with or without abscess formation frequently run the course of an atypical quinsy. Such was the case in the writer's case before referred to. The patient, a man 50 years old, developed what was apparently a simple tonsillitis, both tonsils being involved. He got constantly worse, and within four or five days after the attack started, could open his mouth only with difficulty. Both tonsillar regions were greatly swollen and oedematous, rather more marked on the left side. Several deep incisions in the peri-tonsillar tissue and in the supra-tonsillar fossa failed to show pus. A day or two after that the writer was impressed by the amount of swelling along the posterior and lateral wall of the pharynx, extending well up into the naso-pharynx, and by the distance between the soft palate and posterior pharyngeal wall. A deep incision into the lateral swelling high up was followed by the escape of some pus, with almost immediate and steady improvement in the patient's condition. When a proper laryngeal examination could be made, considerable edema of the anterior surface of the epiglottis could be seen. This must have been much greater while the angina was severe, because there had been a good deal of difficulty in breathing. The name, acute infectious epiglottitis, was given to the cases reported in 1900, and the writer's opinion at that time, that these cases should be classified separately was largely based on the normal pharyngeal findings. Probably if the cases had been seen from their very beginning, a primary origin somewhere in the pharynx might have been discovered.

Semon in his valuable paper, on the probable pathological identity of the various forms of acute septic inflammations of the throat and neck (Vol. 78, Medico-Chirurgical Trans., London, 1895), believes "that the various forms of acute septic inflammations of the throat and neck, hitherto considered as so many essentially different diseases, are in reality pathologically identical, that they merely represent degrees varying in virulence of one and the same process."

Case nine of the series of cases reported by Semon in this paper was similar in some respects to the one that is the subject of the writer's paper. It occurred in an adult and ter-

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minated fatally. In this case an acute edema of the epiglottis and arytaeno-epiglottic folds followed a transitory inflammation of the pharynx. When seen by Semon the pharynx was normal, but the epiglottis had been changed into "an enormous red colored edematous tumor." The patient also developed a brawny induration of the neck. This intensely acute septic condition had a fatal termination in less than seventy hours from its onset.

The origin of the infection in most such cases is undoubtedly somewhere in the ring of pharyngeal lymphoid tissue. This was so in several cases seen by the writer this winter (severe infections of the epiglottis with great edema following apparently slight inflammatory processes in the pharynx), and has led him to believe that such conditions should perhaps not be classified as separate processes.

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TOO OPTIMISTIC RHINOLOGY.

BY B. ALEX. RANDALL, M.D.

In looking back, as many of us can do, to what may be called the pre-rhinological times, it is pleasing to note the decided advance which has been made in our work; and we may well congratulate ourselves upon it and offer warm tribute of thanks to those who blazed and cleared the way for us. Otology has gained much by this progress and, thanks in part to it, has ceased to be an isolated, narrow, often finnikin specialty; it has taken its due co-related place in the broadening, richer surgical field. It was a long step forward when we better appreciated that the nose is a vestibule to the middle ear and the ear an accessory cavity to the nose. More rational treatment of each was inevitable; and the last quarter century has seen most valuable dissemination of the many corollaries which grow out of this central proposition but were all too vaguely grasped or applied even by the few who perceived them. We have to turn to the text-books of that period, and the reports of clinics at home and abroad, in order to convince ourselves that these views and the consequent methods of treatment, now so woven into our grasp of these subjects, were almost wholly ignored by ourselves and our teachers.

Close and essential as is the relation of otology and rhinology, and much as has been done in both lines by many an able man, there is only partial overlapping of their fields—each has a considerable territory beyond the bounds of the other. It is to this fact and as to the otological domain in especial that I would now invite your attention. Time was when ear-work was done mainly by oculists who wagged a little aural tail: now there are too many rhinologists who indulge in a like reprehensible practice. As I taught twenty odd years ago, "it is a narrow and distant view of the ear that can be gained with rhinoscopic mirror alone." The aurist must practise rhinology, if not be a rhinologist, if he is to do justice to his ear-cases; but it is no treason to this association if I claim that he must be more than a rhinologist.

This is not a magnification of the major surgery side of

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otology, with its mastoid, thrombosis, brain-abscess and meningitis operations; this work, like the larygectomies, may be relegated (rarely wisely) to the general surgeon. Nor do I refer to the tests and operations directed to the labyrinth, which are just now looming rather large on the otological horizon, but will soon sink back to their legitimate position. I refer to the catarrhal aural affections, hugely more common, which are extensions from the naso-pharynx and absolutely require rhinological aid for their conquest. Much as we can do in the prevention and cure of such aural lesions, by freeing the nasal respiration, this is often quite inadequate for their full relief; and it is against a too optimistic rhinology, especially in this field, that I voice an earnest protest.

It is hardly necessary to insist that he who undertakes to treat diseased conditions must first fairly diagnosticate the affections so as rightly to apply his measures. I recall a colleague who said to me: "I think all these deaf cases with dull, milky drumheads are due to aspergillus," and seemed surprised at my question as to the permeability of the Eustachian tube. That was before the present swing of the pendulum. Some of my rhinological acquaintances have put in years of naso-pharyngeal treatment, with removal of adenoids and tonsils, but no medication, where Hutchinson teeth and interstitial Keratitis, not to speak of the total loss of bone conduction, should have told even a beginner that it was a case of nerve deafness due to inherited syphilis. Another nerve-deaf patient had had Rosenmuller fossae divulsed by a modern discoverer of that region and daily catheter inflations for two or three months, without any medication for her increasing loss of hearing—a loss which is apt to be increased by such treatment. I do not claim that such measures were instituted or pressed without basis—there may have been much apparent need; yet the cardinal requirement of alterative medication should not have been overlooked, as it had been in a young man lately seen after months of nasal surgery at the hands of an expert that had profited his ears hardly more than the digital exploration or manipulation of his pharynx which he had just received at the hands of an osteopath.

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It is very true that many an ear affection of nasal origin may be incorrigible until the nose has been set in order, although the otologic work ought not to prove wholly wasted; yet it is just as sure that the secondary process may advance unchecked or at least remain unrelieved after its prime cause has been removed. Deaf children with adenoids are constantly being told that they will promptly regain their hearing so soon as the adenoid has been removed. Many may; but we have in our literature a splendid denunciation of "a lie that is half the truth." Certainly in the more chronic cases of catarrhal deafness the very freedom of the Eustachian tubes often points to an atrophic patulency resulting from a hypertrophic infiltration, while within the tympanum like changes have there more or less ankylosed the conducting apparatus. Masterly inaction will here accomplish little for the benefit of the hearing, however thorough may have been the naso-pharyngeal part of the work. Of course, if the aural part of the catarrhal process be only incipient or at most subacute, much of it may clear up spontaneously; yet even here thorough-going otological measures are likely to hasten, ensure and enhance the gain. If the ear condition has reached a chronic stage, it is quite too optimistic to refrain from a good course of catheter treatments; although impaired general health or recognizable nerve-lesion may require prior attention.

Logical sequences do not always or often reverse themselves —signing the pledge will not cure a hob-nailed liver.

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OZENA, DENUTRITION, RESPIRATION AND ADENOIDS,
(New Etiological Consideration)

BY MARCEL NATIER, M.D.

Authors as a whole agree only on the etymological definition of ozena (a good or bad odor). The trouuble commences when one attempts to determine the nature of this affection. In general one admits two varieties of ozena: (a), ozena truly essential or idiopathic; (b), symptomatic ozena. The first category is to my mind purely an artificial creation, for I hold that it is right to trace indistinctly all cases of ozena to a grave disorder of the organism, which enables one to distinguish the original from the results.

Ozena does befall in reality but among the poor people. We explain it in this way: The poor people, considered here, are those who, ruined in their organic constitutions, find themselves from this fact plunged into a state of physiological misery; it comes in contact with the very wealthy, as well as those who are quite destitute.

Physiological misery sometimes exercises its terrible influence in intra-uterine life. Take the case of two parents, being uniquely that of the father and more commonly that of the mother. The mother who constitutionally or for other accidental reasons, finds herself, in the course of her gestation, in a state of the least resistance. Therefore the fruit of her conception is relatively weakened in vitality. Subsequently, and as long as the complete development of the individual is not finished, all cause of susceptible denutrition which influences its entire organism, which is marked by a falling off, will have possibly for a consequence, a deviation, let us say a more or less partial arrest, in the evolution of the various tissues.

This is the general conception of the subject of ozena; the physiological misery, originally sufficient and necessary by proven manifestations is, in the first place, a principal and great satisfaction for the mind naturally bent toward unity.

It has, moreover, the great advantage of according between them the multiple etiological theories, involved a little by chance without ideas concisely directed and after single cir-

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cumstances. For these obscure views, too narrow and too complicated, it substituted a formula very simple, very large, and very clear. Thanks to it, with a little reflection, one succeeds without trouble in seizing the link and in understanding the influence of different etiological factors incriminated in the production of ozena (heredity, age, sex, consanguinity, race, diatheses, trophoneuroses, etc.), which one finds everywhere so copiously enumerated.

A long and patient study of cases which have come to my personal observation permitted me to advance, for the first time ten years ago,[1] the opinion that ozena was solely indicative of a profound, general denutrition of long standing. Numerous facts have subsequently confirmed me in this hypothesis. Because it is still far removed from having the general consensus which it is worthy of, I believe it is necessary to return to it once again, and also, I add to-day a new proof of undisputable evidence to the demonstrations which I have already given[2] and which I am able to multiply.

Observation. A man, 30 years old, height 5 feet, came to consult me May 6, 1913.

Hereditary Antecedents. Father married at 33 years of age. Successively cook, clerk in a wine shop, and finally a wine merchant himself. At the time of the birth of his son a great drinker and a great eater of meat. Very nervous, diabetic.

Mother married at the age of 39, died at 61. Was a cook, drank to excess (wine and coffee). Diet very highly seasoned. Nervous, mediocre health. Constant trouble with nasal breathing. No trace of ozena on the father's and mother's side.

Personal Antecedents. Born at Paris—full term and in good condition. Put out to nurse in the country immediately. Brought up on the bottle; deplorable state. Brought back home at six months of age and confined successively to two nurseries.

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[1] Marcel Natier (Ozena et Alterations in the Digestive and Respiratory Functions, Soc. Medic. du IX Arrond. de Paris, 9 Juin, 1904).

[2] (a), Ozena and respiratory gymnastics (Transactions of the American Laryngological Association, 1910); (b), Ozena, nutrition and respiration (*Ib.* 1911).

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Very badly cared for at the house of a neighbor who jeopardized him. In summing it up: A disastrous first year.

Lived with his parents. Miserable infancy. Puny and whimpering. Chest badly developed, stunted height, "small in stature."

At six years of age catarrhal fever, followed by a very bad constipation.

Early dental troubles; teeth crumbled like plaster. Half a dozen were already decayed at 15 years of age; necessitated special care up to the twenty-fifth year.

Put at school from five to fifteen years of age. Mediocre results. Memory very faulty, work slow and laborious. Average instruction.

From fifteen to seventeen years, copper-plate engraver; great fatigue, but developed muscularly.

From seventeen to nineteen years helped his father in selling wines at retail. Constantly drank too freely.

From nineteen to twenty-two years in the military service. A great deal of fatigue the first year; in the course of the third year, anxiety caused by the death of his mother and the persistent objection of his father to his marriage. His falling off was very marked.

Since the return of the regiment an accountant, not having ceased as such, from working under defective conditions. Here for a year he passed his days in an office without air, always lighted by artificial light.

Married for nine years. Two boys, the elder, aged six, affected by an incontinence of urine day and night.

Headaches. Since infancy, regularly, at least once every fortnight; appeared particularly in the afternoon; would burst into tears. This disappeared toward the seventeenth year, by the precautions against constipation, but returned always intermittently.

Sleep. Troubled by frequent dreams, nightmare with cries; never complete repose; felt himself without courage at least twenty-five days out of thirty. Proportion exactly reversed after marriage. Actually slept at least seven hours each night.

Digestive System. During his entire infancy defective hy-

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giene (too much meat, wines, coffee, appetizers); always a large eater.

In the fifteenth year, for six months, a fit of hunger seized him. At 7 o'clock took a bowl of chocolate filled with bread, which had absorbed all the liquid; at 9 o'clock ate; a great hunger at 11 o'clock, and was exhausted at noon. At the table literally devoured everything—heaviness of stomach. Ate in the course of each day—outside his meals—four raw eggs, salted and peppered copiously, in which after beating up he soaked his bread. From time to time, for a change, beefsteak and potatoes—also cod liver oil. After six months return to ordinary diet. Always slight fits of hunger.

Four years ago the first cramps of the stomach appeared; daily; very painful; might come unexpectedly in the morning or toward five in the afternoon. Impossible to eat much at the time of the meal; sensation of fullness, hardness and distension of the stomach, with very acute epigastric pains. The phenomena accompanied by alkaline, brown and bitter vomit. Cessation six months later, after a period of military service of three weeks.

Since the age of twenty-three years impossible to take food salted or highly seasoned, nor drink certain liquids—coffee in particular. When he came to see me, he was always subject to the return of gastralgia with return of acids, pandiculations, somnolences.

Constipation has continued since infancy; slightly ameliorated in later times.

Excessive falling off in weight in spite of abundant over nourishment.

Cutaneous System. At the end of the fifteen years acne increased in the course of time. At seventeen to twenty-six, eruptions with itching (arms, chest and back), made one suspect venereal infection.

Skin oily; yellow and muddy. Perspiration rather rare. Since the age of fifteen hyperhidrose of the feet—very painful—overcome at twenty-three, by wearing woolen socks.

Respiratory System. Constant colds in the head from earliest infancy; sense of smell blunted; difficulty in nasal re-

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spiration. From sixteen to seventeen years, in a special clinic each month: galvanic cauterizations of either one or the other nasal passage; daily washings of the nose with a boric solution; no special care of the general conditions.

At the end of this time the mouth persisted in remaining open. Naso-pharynx curetted.

Let us stop at this curettage—the results following were particularly bad. In fact, shortly after the adenectomy the patient was, for the first time, seized with a serious, acute sore throat, forcing him to keep to his room for ten days. Ultimately the nose and throat became more sensitive (dry and affected by intense colds or heats). Contrary to habit, contracted colds in the nose, throat and chest. The latter was taken from time to time. During his nineteenth year he also took bronchitis for the first time, and it was feared it would develop into tuberculosis. Since then has had incessant colds, always complicated by bronchitis. In summing it up, the ablation of the adenoid vegetations has had unquestionably for consequence a great sensitiveness of the cervical region and of the part above the chest.

Other results of the operation: A thickening more and more of the nasal secretions, with a marked tendency to fall back into the throat in a greater abundance. The secretions for six years have taken on a greenish color. At the end of this period has soiled two handkerchiefs a day. Offensiveness, intermittent for a year; was six months ago of such intensity for fifteen days that he had to keep his handkerchief wrapped in a paper so that the sickening odor did not go through the pocket of his garment. The crust was blood stained.

From his first visit the patient contented himself in using, at intervals, the boric acid nasal irrigations—invariably followed by a distressing coryza.

Genito-Urine System. Normal. No venereal affection.

Eyes. After 27 years of age troubled with watering of the eyes, more pronounced in the right.

Ears. Periodically, abundant secretion of wax.

Mental State. Tendency to sadness, especially during the periods of eruption. Diminution of the intellectual faculties.

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Quickly out of temper from argument in a discussion; he declares himself beaten when he is assured of being right. Incapable of reflection. He is very long in making a decision.

May 6, 1913. Depressed expression. Dull look; abundant acne of the face.

Nose. No external deformity. Septal deviation to the right. Enlargement of the nasal passages by partial absorption of the middle and inferior turbinates. *Atrophy* were marked in the left. Mucous membrane pale and anemic.

Secretions thick, sticky, abundant, offensive scabs. No sinusitis.

Naso-Pharynx. The posterior part of the turbinated bone and the nasal pharynx covered over with mucous similar to that of the nasal passages. Atrophied and greenish crust. Protruding granulations from the posterior wall.

Larynx. Vocal cords slightly paretic.

Thorax. Emaciated, narrow.

Respiratory amplitude greatly reduced. Absence of vesicular murmur at the apex. No sign of tuberculosis.

Treatment. Cleanse the nasal passages; but above all, fight the cause of the affection. Consequently severe regime of eating, with milk for the foundation. Regular exercises of breathing gymnastics.

Results. At the beginning of the milk diet, severe diarrhoea; which stopped definitely at the end of five weeks and was replaced by normal, spontaneous movements. Cessation of the cramps of the stomach, the oculatory trouble and the hyperhidrose of the feet.

Nasal secretions diminished in abundance and scabs form only at rare intervals.

Fleeting reappearance of the odor during the great heat in August.

One handkerchief a day is now sufficient.

General health excellent. Skin of his face in much better condition. Color clearer. Acne rare.

November 9, 1913. Meat given with the milk—vegetable diet for a month; has provoked in the first eight days painful heavi-

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ness of the stomach, with a slight tendency to constipation. Return of previous good condition by reducing diet.

Morally perfect. A marked taste for work; greater evidence of mentality. Crusts still abundant, the persistence of which may be attributed in all probability to the bad hygienic conditions, where the patient, who has never given up his ordinary work, is found.

Actual Condition. Nose. Mucous membrane normal in color —no crusts.

Pharynx. Disappearance of the shiny aspect.

Larynx. Perfect coaptation of the free border of the vocal cords.

Lungs. Throughout respiration there is a normal vesicular sound. To permit of the increase of the thoracic expansion of four centimeters it became necessary to enlarge his garments.

Weight. From 58 k., 350 gr., at beginning of treatment half a month later to 54 kil.; to return to 59 k., 760 gr. (November 9, 1913).

It has seemed necessary to me to relate in support of this thesis which I present, the complete pathological history of my patient. From curtailed observations thrown into the discussions merely to make a greater number of facts and to pad the statistics, only superficial and confused impressions are left in the mind. A fact may be big with very deep thought; these thoughts will result in greater and more fertile number than they will have been produced by abundant, substantial, precise details. To those who do not make the effort to discover them, the profound depths of these things, remain in general, impenetrable.

If, grouping the divers elements furnished by a minute analysis, we pass now to a work of reconstruction and proceed to the synthesis we will sway the question thus and will obtain a just view of the ensemble. The relation is easy enough to grasp from the diverse conditions experienced by the patient in arriving at his present condition. By his hereditary antecedents, in fact, he was legitimately enabled to be susceptible to the weakness of the congenital organs. This lessened resistance, has in the course of time, not only continued, but has

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been more aggravated during the course of infancy and adolescence due to complete ignoring of the practice of the most elementary hygiene. Above all, great caution should have been exercised over the old digestive troubles, as they had so gravely altered the general health. On the same level of importance I place the respiratory difficulties. The simultaneousness of the analogical perturbations of the digestive and respiratory systems makes it a rule of parallel cases of the same subject. The other phenomena, cephalies, cutaneous eruptions, troubles of sleep and of sight, hyperhidrose of the feet, intellectual inaptitude, mental depressions, etc., which I have already many times insisted upon, are all as unvarying.

In these conditions the ground was especially prepared for the manifestation of ozena. On what was going to be the true cause determining its production? To reply to this question it is sufficient to direct oneself to a higher description, and to one of which the live interest will certainly not have escaped a keen lecturer. He will have been, as I myself have been, surprised at the results of the adenectomy. They were, in a general way, rather unfavorable to the subject. As to the ozena, it is, we claim, just after the operation that it commences to produce itself in the secretions, a modification particularly serious. Very quickly they become more abundant and thicker, becoming progressively crusty, greenish, and finally ozenatous. What does this mean? Is it necessary to regard the succession of facts so varied as simple, accidental coincidences? To the contrary, convinced by their connection, we must see between the operative intervention and the coming of ozena a forced relation from cause to effect—the evidence shows itself. The organic resistance—even the suffering due to bad general health found itself definitely abolished after the ablation of the adenoid tissue. The appearance of the immediate accident is a first proof of this hypothesis; it finds itself ultimately confirmed by the secretory troubles which result in ozena.

Remarks relative of the deformations of the nasal construction: The general denutrition, if it has been very marked from an early date, it is only natural that after the fashion of the other parts of the skeleton the bones and cartilages of the

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nose should be stopped in their development; therefore the nose is saddled with positive ozena. On the contrary, with the benign manifestations, appearing very tardily, and with a slow step, the bone and cartilaginous development takes place following a normal type, and this malformation will be avoided.

Let us try to pick out of these facts the exact instruction which they carry. At this cross-roads, where they find themselves reunited, the opening of the orifice of the Eustachian tubes, the entrance of the respiratory and disgestive passages, and also the base of the brain, the presence of a barrier as powerful as adenoid ring, could not be a pure chance. If the importance of its physiological role has not yet been firmly established, let us turn our attention to that which will reveal to us clearly some future day, the incontestable utility of the secretory functions of the adenoid tissue. Its excessive vascularization, which made of it a veritable bloody lake, has always astonished me so much more than the fact that it finds itself exactly in a narrow connection with the base of the brain. Viewing its constant presence at this age, the adenoid tissue is worthy of being regarded as indispensable, not only to the security, but still more to the development of the individual during infancy and adolescence. A veritable barometer of the organism of an exquisite sensitiveness, its variations, for him who thoroughly comprehends them, lead often to practical results of the highest interest.

These reasons of the anatomical and physiological order commend themselves intensely through sheer necessity to the thought of reflective and scrupulous minds. Also, agree with me, to have the adenoid tissue play the role which seems peculiarly suited to it, as one can only become alarmed from the inconsiderate and too early ablation. Even as one sees in fact, in these predisposed subjects, as the one just in question, the adenectomy followed by atrophy of the mucous membrane (nasal, pharyngeal and laryngeal), so ought we to rightfully admit equal reports on the bone and cartilage tissues. One interposes to the contrary that while the growth is already sufficiently advanced, and better still, terminated, so the bone

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deformation and ozena itself are hardly more to be dreaded. This is why my patient, who has not the least apparent trace of nasal deformity, has on the other hand waited thirty years to show the offensiveness which recurs intermittently. This explains the role, always and forcibly secondary, of the multiple and diverse factors too lightly blamed from grave secretive disorders known as ozena to the level of mucous membrane, as they manifest themselves under the form of constipation—to the level of intestinal catarrh.

The Divisions, (a), primitive ozena; (b), secondary ozena, ought to be in the future abolished. Ozena is not in fact a real "morbid entity," but uniquely one of the principal symptoms of advanced atrophic rhinitis, itself a regular expression of a profound physiological misery of variable cause and accompanied in particular with marked and old disorganization of the constitutionary elements of the nasal passages.

The adenoid tissue of the naso-pharynx is otherwise in all probability necessary to the protection and to the development of the organ. It atrophies itself of its own accord, having achieved the formation and having finished its role. The premature suppression would not be foreign to the production of the atrophic rhinitis with ozena. Thus except in urgent cases, and also in cases where time does not overcome the growth, you must have respect for adenoid tissue.

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Candidate's Thesis.

THE LARYNX IN ONE HUNDRED CASES DYING OF PULMONARY TUBERCULOSIS.*

A Clinical Post-Mortem Study.

BY GEORGE FETTEROLF, M.D.

This paper is the outcome of an attempt to ascertain to what degree those dying from pulmonary tuberculosis suffer from tuberculous disease of the larynx. The material studied consisted of the larynges of one hundred patients who had died at the Henry Phipps Institute, and who had had autopsies performed on them by Drs. C. Y. White or P. A. Lewis, pathologists. In each case the larynx had been removed and examined at autopsy simply for the presence or absence of tuberculous disease. It had then been hardened in formalin and later transferred to alcohol. To have conducted this investigation on fresh material would have been better, but this was impossible, as the hour of holding the autopsies precluded the attendance of the writer.

The specimens were studied in the following way. The upper margin of the epiglottis and of the aryteno-epiglottic folds, and the upper surface of the arytenoid cartilages were first examined. Then the tongue was cut away flush with the anterior surface of the epiglottis to allow of careful study of the latter. Following this the hypopharynx and the esophagus were split posteriorly and turned aside, so as to expose the posterior surface of the arytenoids. Then the hyoid bone was divided with bone forceps, and the epiglottis and the thyroid and cricoid cartilages were split in the anterior median line. The larynx was then cautiously spread apart, so as not to tear the posterior commissure, and all hardened and adherent sputum was removed from the interior of the larynx and its ventricles. After a study of the laryngeal interior a posterior vertical cut was made between the arytenoid cartilages and through the signet part of the cricoid. Following this twelve pieces were cut out

* From the Henry Phipps Institute of the University of Pennsylvania.

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for microscopical study, the removed portions being one from each half of the epiglottis, both aryteno-epiglottic folds, both arytenoids, a section of each vocal cord, a section of each ventricular band, and a section from each half of the interarytenoid tissue. When gross lesions were present the segments were cut so as to include them.

The present report will deal only with the gross appearances, the microscope findings being left for a future communication.

Of the patients from whom the specimens were removed sixty-eight were males and thirty-two were females. This discrepancy is apparent only and is due to the fact that the Phipps Institute at that time had accommodations for twice as many male as female patients.

Of the one hundred cases eighty-three showed gross tuberculous lesions, thirteen showed absence of disease and four were doubtful. In other words, eighty-three per cent of these one hundred patients dying from pulmonary tuberculosis or its complications had definite gross tuberculous involvement of the larynx. The probability is that the percentage of those having actual disease is greater than eighty-three, for unquestionably some of those which appeared normal to the unaided eye will show tubercle formation under the microscope.

The Epiglottis.

This cartilage was involved in fifty-nine cases, was free of disease in thirty-seven and was of doubtful appearance in four. Here again the microscope will probably increase the number of cases in the positive list. This much, however, can be stated: Over half of the dying cases of pulmonary tuberculosis will present to the clinician infiltration or ulceration of the epiglottis. A practical corollary to this statement is that over half of the dying tuberculous will need relief for the pain they suffer in swallowing. Involvement of the epiglottis practically always causes odynophagia, and a sad feature is that there exists no adequate local method of giving relief, short of some surgical procedure. And the cases in which the latter can be used are few, on account of the small number of consumptives, taking the world over, to whom skilled laryngologic technique is available.

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The form, location and multiplicity of the lesion varied greatly. Naturally the different forms are simply different stages or phases of the tuberculous invasion, and they are described more from the clinical than from the pathological point of view.

Infiltration.—This manifests itself clinically as thickening and, in life, congestion. Incidentally, pallor is rarely, if ever, seen in diseased parts of the tuberculous larynx. In an uninvaded larynx in a tuberculous patient, the mucosa may be pale, as part of a general cachectic pallor, but where the tuberculous process exists there will be found congestion contiguous to it.

Infiltration alone was found in twenty of the fifty-nine cases, and in each one of the twenty both halves of the epiglottis were involved. In only two of the twenty was the infiltration more marked on one side than on the other. This is as would be expected, for there is no part of the larynx, with possibly the exception of the interarytenoid space, which would be less affected by a more or less constant one-sided decubitus and consequent accumulation of bacillus-laden sputum, than would be the epiglottis.

In nine of the twenty the thickening was confined to the upper edge, and in five of these nine to the central part. In one case there was associated with the infiltration a large tuberculoma which covered the cushion and the area immediately below it. In another there was found marked edema of the supra-lingual portion of the epiglottis; a curious feature of this case was that the edema was confined absolutely to the anterior surface of the cartilage, the posterior surface being unaffected.

Infiltration with Superficial Ulceration.—This represents a later stage than mere infiltration, and was found almost as frequently, nineteen cases presenting this combination. Of these nineteen, eighteen involved both halves of the epiglottis, but a single case being limited to one side.

The ulcers varied in number, in five cases there being but one; in the others they varied from two up to a large number. No enumeration was made in those presenting a large number.

As regards location they showed a marked predilection for

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two sites, viz., the upper edge and the laryngeal surface. In but one instance were there any found on the lingual surface; in this specimen there were many erosions and they were widely distributed over the laryngeal and lingual surfaces, as well as on the free edge. Evidently the anterior facies is not as vulnerable as it looks. Comparing the appearance of the two surfaces, the laryngeal certainly *looks* tougher than the lingual. This, in combination with the thought that infective sputum would tend to gather in the glosso-epiglottic fossae, would *a priori* suggest the anterior surface as a likely spot for infection. Such is evidently not the case, however. Those parts of the cartilage which are most exposed to the air, food and sputum streams show the preponderance of infection. With these findings in mind one is tempted to conclude that the anterior facies of the epiglottis should be regarded clinically as a part of the mouth, and the posterior facies as a part of the larynx.

The single ulcers were located as follows: Four were on the upper edge and one, quite large and very shallow, was situated on the cushion near the median line. In one of these specimens one-half of the cartilage was almost completely denuded of epithelium and associated with it was a large tuberculoma on the laryngeal surface.

When the free margin is involved, both in infiltrative as well as in ulcerative lesions, the upper is much more frequently involved than are the lateral edges, probably on account of a poorer blood supply, but possibly, too, on account of its being more in line with the glottis and the exhaled sputum.

Infiltration and Deep Ulceration.—This combination was found in four cases. In one it consisted of a single ulcer on the free margin, with the cartilage protruding from the base as a knife-like edge; in the second there were numerous small ulcers on the laryngeal surface and extending into the cartilage; in the third there were ulcers on both surfaces, as was also the case in the fourth along with similar lesions of the free edge.

Infiltration with Superficial and Deep Ulceration.—Three cases fell into this group, and in all of them the general involve-

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ment was of the same plan, viz., thickening and shallow ulceration of the free portion, with deep ulcers in the neighborhood of the cushion.

Superficial Ulceration.—In this group are placed those cases which presented ulcers, with no infiltration except immediately around the ulcer. There were found ten of these, and in each one the involvement was bilateral; the ulcers were multiple in every instance. Of the two surfaces of the cartilage, but one, the laryngeal, was affected, and all of the ten cases were confined to this facies, with one exception, and in this the upper edge was involved. In one case the cushion was the only part affected.

Deep Ulceration.—This group is intended to include those cases in which there had been marked loss of tissue. Four cases answered the description; in two the whole upper edge of the epiglottis had sloughed away, in the third the entire left edge was gone, and in the fourth the cartilage was bare at the upper edge for the length of 1 cm.

Tuberculomata were found springing from the laryngeal aspect of the epiglottis in two instances. Both of them were sufficiently large to hide most if not all of the cords during life. They must have interfered to some extent with the respiratory act.

The Aryteno-Epiglottic Folds.

Fifty-eight cases showed positive gross evidence of tuberculosis of these structures, fifty-seven bilaterally and one unilaterally. As a rule, these folds do not become affected early in the disease, and it is therefore natural to expect the involvement to have become bilateral when the invasion has extended this far. This fold is rarely the primary site of the laryngeal disease, its infection usually being secondary to that either of the epiglottis or of the arytenoid, or more rarely of the ventricular band.

Infiltration only was found in forty-eight of the bilateral cases and in the single unilateral case. There was no great tendency shown toward the localization of the disease in any particular portion, although in a few instances certain parts showed a preponderance of disease. In eight the cartilages of

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Wrisberg were the most notably hypertrophied, while in two the infiltration was confined to the arytenoid end of the fold. In six the amount of swelling was greater on one side than on the other. Distinct submucous tubercles were visible in three, in one instance being confined to the mesial surface, and in another to the same surface and to the superior margin.

Edema in conjunction with infiltration was found in a surprising number of instances. This condition was assumed to be present when the mucosa was found to be markedly shriveled, and was noted in twenty-two of the forty-nine infiltrated cases. This is probably explained by the loose histological texture of the fold, and this structural condition probably is the reason why so few of the tuberculous lesions found here are ulcerative. The looseness of the tissue allows of ready infiltration, and clinically it is sometimes quite astonishing to see with what rapidity a tuberculous process will advance along this fold from a red and swollen arytenoid, or from an epiglottis in the same condition. Again, the comparative infrequency of ulcers may be due to the fact that large areas of submucous tissue may be extensively infiltrated or caseous before the pressure becomes sufficiently great to cut off the surface blood supply and cause necrosis of the mucosa.

Infiltration with Superficial Ulceration occurred in seven cases, in four of these the disease being of similar degree on both sides; in the other three the infiltration was on both sides, but the ulcerative process was on only one. In one of the former the process was so extensive that the fold was practically denuded of epithelium. In another there were submucous tubercles on both sides, but on only one had these become confluent and opened on the surface. In a third the ulcers were noted as appearing on the internal surface only.

Infiltration with Superficial and Deep Ulceration was found in but one instance. In this specimen the disease was very extensive, there being no portion of the larynx unaffected by the tuberculous process.

Deep Ulceration alone was found once. This was in a specimen in which the disease was very general and far advanced.

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Deep ragged ulcers were found on both surfaces of the epiglottis, on one ventricular band and on both arytenoids. Thus surrounded there is every reason why the folds should have been so extensively diseased.

Associated Disease.—Of the fifty-seven bilateral cases, forty-four were associated with tuberculosis of both arytenoids and forty-two with similar disease of both halves of the epiglottis. Two presented concomitant disease of both arytenoids, but of only one-half of the epiglottis. Five of the fifty-seven bilateral cases had associated involvement of the arytenoids only, and one of the epiglottis only. In three of the bilateral cases the fold presented evidence of disease independent of both the epiglottis and the arytenoids. Of these three specimens, two showed no signs of disease anywhere else in the larynx, while one had an associated involvement of one vocal cord.

The Ventricular Bands.

Forty-two cases showed undoubted tuberculosis of the ventricular bands and one was doubtful. Of the forty-two, thirty-eight were bilateral and four were unilateral. This is as would be expected, for these structures are not of those which are the most susceptible to tuberculous invasion, and therefore, they are usually involved in the later stages of the disease, where the tendency toward wide-spread involvement is more pronounced. They infrequently are involved alone. Occasionally, in the living, one will find a larynx in which a single vocal cord is hidden to a greater or less extent by an infiltrated and swollen ventricular band, but these cases do not occur with any great degree of frequency.

Of the thirty-eight bilateral cases, thirty-two presented similar lesions on the two sides. This is another point tending to show that isolated lesions of this part of the larynx are rare and that involvement of the bands is indicative of a general rather than a localized process. Additional evidence of this is furnished by the fact that in thirty-six of the thirty-eight practically the entire larynx was involved in the tuberculous process.

Infiltration.—Eighteen of the thirty-six, just half, were simply infiltrated, the evidence in general being a thickening of

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the band and a rounding of its free edge. In three the mucosa was quite shriveled, and a fair assumption is that this condition is a vestige of edema which had existed during life. In one the tissue of the hand was peculiarly spongy in texture, a condition whose pathology must be left to microscopical examination for interpretation. In one the normal band tissue was entirely replaced by irregular nodular tissue. This same condition prevailed on the arytenoids and cords, and the epiglottis was the seat of a large tuberculoma. This larynx probably is a good specimen of the hyperplastic form of the disease, and should prove very interesting under the microscope. In another specimen the mucosa of one band was quite shaggy; possibly this is another case of hyperplasia similar to the one just described. Two specimens showed a preponderance of infiltration of one side over the other. This is a very small proportion and points still further to the probability that involvement of the bands occurs seldom except when the invasion is quite general.

Infiltration with Superficial Ulceration was found in three cases and was bilateral in all three. In one there was present infiltration alone on one side, and a superficial ulcer on the other, while in three others one band was infiltrated and the other was the seat of a deep ulcer. All three of these ulcers were just above the vocal process of the arytenoid and extended sufficiently deep to expose the cartilage.

Of the four unilateral cases, all presented simple infiltration only. One was associated with bilateral ulceration of the epiglottis and one with a similar condition of the vocal cord of the same side.

Superficial Ulceration.—This stage of the disease was found in seven of the thirty-eight bilateral cases. In two the ulcers were confined to the lower surface, and were really ulcers of the upper boundary of the ventricle. In one the band was practically denuded of mucous membrane and was studded with tubercles. Had this patient lived longer these tubercles probably would have become confluent and broken down, resulting in an extensive destruction of the laryngeal interior.

Deep Ulceration.—This is noted as having occurred in four

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of the thirty-eight bilateral cases. In two the bands shared in large ragged ulcers which were located on the anterior aspect of the arytenoids. In a third the bands were involved coincidently with the epiglottis in large, deep ulcers situated near the lower end of the latter.

In two cases one band was ulcerated superficially and the other deeply. In both of these the more advanced lesion was at the vocal process and in one was shared in by the vocal cord.

Associated Laryngeal Disease.—As bearing on the conclusion that involvement of the ventricular bands is likely to occur only late in the disease and as part of a generalized process it is interesting to note to what degree the other parts of the larynx were involved in cases which showed infection of the bands. The figures in this connection are as follows, and, like all the enumerations in this article, they probably would be altered slightly were the observations checked by microscopical study:

All the rest of the larynx	32
Epiglottis, aryteno-epiglottic folds and arytenoids	1
Epiglottis, aryteno-epiglottic folds and vocal cords	1
Epiglottis, arytenoids and vocal cords	1
Aryteno-epiglottic folds, arytenoids and vocal cords	1
	36

The Vocal Cords.

Either both or one of these structures were involved in forty-nine cases, both sides being affected in forty-two and one side in seven.

Infiltration alone was noted in ten cases, all of them bilateral. In one of these there was a large tuberculoma on the epiglottis, while the rest of the laryngeal interior was markedly nodular. The cords were very irregular and were dotted with tubercles on both their upper and mesial surfaces. In only one was the involvement more marked on one side than on the other, the remainder showing about the same amount of disturbance on the two sides. In one there was a marked roughness on only the free edge. In but one was there any edema.

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The combination of later stages than infiltration with this condition was found to be more varied and protean than in any other part of the larynx.

Infiltration with Superficial Ulceration was found bilaterally in three instances, and in a fourth one side presented this combination, while the other was infiltrated only. Infiltration of one cord with superficial ulceration of the other was found once.

Infiltration with superficial ulceration of one cord without any involvement of the other was seen in two instances. In one there was a single shallow linear ulcer on the adductor margin and anterior to the vocal process, while in the other there were two such ulcers.

The combination of *infiltration with deep ulceration*, the condition being present on both sides, was found but once. This specimen was rather unique in that the greatest amount of involvement, and all of the necrosis was in the anterior part of the cords. This case is a reminder to the writer of another rare lesion seen in the living. Both cords in this instance were red and granular, and eventually they both ulcerated at their anterior halves. Subsequently to this the cords began to fuse, until finally they were joined absolutely into one broad, white sheet in their anterior half. Posteriorly there was left a small rounded glottis, which was adequate for respiration; the voice was a whisper only.

Infiltration with Deep Uulceration of one cord, the other being normal, was noted once. The ulcer was a large, ragged one and was located just in front of the vocal process of the arytenoid cartilage.

Infiltration of one cord with infiltration and deep ulceration of the other was noted in one instance, the ulcer being at that favorite site for such lesions, viz., the vocal process of the arytenoid. Infiltration of one cord with deep ulceration of the other was observed once.

Infiltration and superficial ulceration of one cord with infiltration and deep ulceration of the other was found twice. The shallow ulcers were found on the ventricular and infraglottic surfaces of the one cord, while the deep ones were located at the vocal process. In one of these cases a small

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pedunculated growth was found attached to the anterior part of one cord.

Superficial Ulceration was observed in eighteen specimens, bilaterally in fourteen and unilaterally in four. In four specimens the ulcer was of the nature of a shallow fissure. These usually started at the vocal process and extended forward on the adductor margin for a varying distance. In only one specimen were they on the superior surface of the cord. They were of the rounded form in ten cases and nine of these were situated at the vocal process. In the tenth the lesion of one side was small and located at the vocal process, while that of the other involved the posterior two-thirds of the approximating surface.

Deep Ulceration was present in four of the specimens, all bilateral and all situated anterior to the vocal process. In one the entire floor of the ulcer was studded with tubercles.

The Arytenoid Cartilages.

These structures were involved in fifty-seven of the one hundred cases. A rather curious feature is that all of them were bilateral, not a single specimen of the series showing disease of one cartilage alone. At the same time it should be stated that in a number of instances the involvement was greater on one side than on the other.

Infiltration only was present in forty-four of the series, and in two it was noted that the cartilages were of huge size. These were both of that clinical type, seen rather rarely, in which the larynx, especially the upper ring, composed of the epiglottis, the aryteno-epiglottic folds and the arytenoids, becomes tremendously infiltrated and remains so. These cases may cause little discomfort, and they may hang fire for months, or as seen by the writer in two instances, for years, the patient dying of tuberculosis but the larynx apparently being a very slight factor in his illness.

In one of the forty-four the arytenoids were very nodular and irregular, as was the entire larynx, and in another sub-

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mucous tubercles were visible in the upper portion, not a common feature of tuberculosis of the arytenoids.

The infiltration was notably greater on one side in six of the specimens.

Edema of the infiltrated arytenoids was present in twelve of the forty-four. In one of these it was noted as being "tremendous," in a second as "marked," while in a third it was present on only the posterior surface. This condition of the last specimen must have caused serious mechanical interference with swallowing.

Infiltration with Superficial Ulceration occurred in eight cases. In seven the lesion was symmetrical, the eighth showing infiltration of both sides with ulceration of but one. In but one of these was the arytenoid of any very great size, this specimen showing infiltration to the size of a cherry. In three of the eight the ulceration extended beyond the laryngeal surface of the cartilage, two of them being involved on their pharyngeal and one on the superior surface. In one of the four the cartilages were practically denuded throughout of epithelium, a condition which must have been productive of hideous suffering.

Infiltration with Deep Ulceration was found in three cases, each differing from the other. One showed marked enlargement of the cartilages, with deep, ragged ulcers at both vocal processes. A second showed marked infiltration of both arytenoids, with a deep, narrow ulcer at the vocal process on one side only. In the third both were infiltrated, while one was the site of a small shallow ulcer and the other of a very deep one which bared clearly the vocal process.

Deep Ulceration only was noted twice, in one instance deep symmetrical ulcers being present at the vocal process, and in the other one being above this process and the other on the laryngeal aspect of the cartilage.

The Interarytenoid Space.

This area was found to be involved in forty-nine specimens, and in none of them were found conditions which endangered life. Usually the earliest signs of the disease are found here, and undoubtedly a much larger proportion than forty-nine per

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cent. would show microscopic evidence of disease. Here is frequently found the cause of the early hoarseness so often noticed, but this depends on the position of the lesion. If the latter is low down and between the vocal processes hoarseness is early evident, but, on the other hand, there may be quite large masses present in the upper part of the space without any notable vocal change. Indeed, it is quite disappointing to remove such masses from the posterior wall and then find no improvement, because a small amount of thickening inferiorly is the cause of the hoarseness.

Infiltration of varying degrees was present in forty-seven cases. In the vast majority this consisted of a small amount of thickening of the area. In three there were found quite large masses projecting forward between and above the vocal cords.

In two specimens was found a rather unique and entirely unexpected condition of affairs. Both presented the same surface appearance and in both was found precisely the same condition when the larynx was cut into for specimens. The space was somewhat elevated and when a knife was passed vertically between the arytenoids and down to the cricoid both above and anteriorly it was seen that the posterior commissure was the seat of a small spherical submucous abscess of about the size of a sturgeon's egg, as is found in caviare. While this form and location of lesion may have been described, the writer has no recollection of having met with it in the literature.

Superficial Ulceration was found four times. It probably was present more frequently, but this area was found to be the most difficult of all in which to diagnose lesions in the preserved specimen. As stated in the beginning, this study is one of gross conditions only, of conditions such as would meet the eye of the clinician and the figures presented must be accepted from that standpoint only.

General Summary.

Tuberculous	83
Non-tuberculous	13
Doubtful	4
Total	100

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Epiglottis.

Tuberculous	59
Non-tuberculous	37
Doubtful	4
Total	100
Infiltration	20
Infiltration with superficial ulceration	19
Infiltration with deep ulceration	4
Superficial ulceration	10
Deep ulceration	4
Tuberculoma	2
Total	59

Aryteno-epiglottic Folds.

Tuberculous	58
Non-tuberculous	42
Doubtful	0
Total	100
Infiltration only	27
Infiltration with edema	22
Infiltration with superficial ulceration	7
Infiltration with superficial and deep ulceration	1
Deep ulceration	1
Total	58

Ventricular Bands.

Tuberculous	42
Non-tuberculous	57
Doubtful	1
Total	100
Infiltration	18
Infiltration with superficial ulceration	11
Superficial ulceration	7
Deep ulceration	6
Total	42

Vocal Cords.

Tuberculous	49
Non-tuberculous	51
Total	100
Infiltration	10
Infiltration with superficial ulceration	7
Infiltration with deep ulceration	6
Superficial ulceration	18

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Superficial and deep ulceration	4
Deep ulceration	4
Total	49

Arytenoid Cartilages.

Tuberculous	57
Non-tuberculous	43
Total	100
Infiltration	44
Infiltration with superficial ulceration	8
Infiltration with deep ulceration	3
Deep ulceration	2
Total	57

Interarytenoid Space.

Tuberculous	51
Non-tuberculous	49
Total	100
Infiltration	47
Superficial ulceration	2
Total	49

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Candidate's Thesis.

OPERATIVE TREATMENT OF CLEFT PALATE.

BY JOHN E. MacKENTY, M.D.

In presenting this subject I am well aware that a small library would not contain the mass of literature at present surrounding it. My apology is that, of necessity, every operator, in this discouraging field, must view it from a slightly different angle, and thus may add an idea or two to its betterment. That so few surgeons are actively interested in the correction of this deformity may be due to the feeling that the last word has been said; that the operative treatment has reached its limit of perfection, and with all a large percentage of failure remains; not so much cosmetic perhaps as functional. For in spite of a well accomplished operation, correct speech does not always follow. This latter failure is not so evident among the well-to-do as in the poorer classes from which a very large percentage of our cleft palates comes. It sometimes takes years of persistent teaching to make the surgically cured palate functionate, and the uneducated poor have not the intelligence, the time or the money to follow this course of training. Then there are the cases living in country districts where proper training is not available. My experience convinces me that the percentage of speech failure is much larger than that of surgical failure. In my cases operated on after the tenth year, speech improvement in many cases was negative. Where the Lane operation was done or where there was much cicatrization and contraction of the soft palate, speech was but slightly improved at any age. Nor can I see much hope for such cases in that direction. Where operation was done at an early age (in the first or second years), and the soft palate was carefully preserved intact, I have had some very satisfactory results in speech. Therefore, I would here set down two rules: First, that the operation be completed before the end of the second year, and second, that all operations that split or deform the soft palate in any way should be done only as a last resort.

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The operations which have for their object the crowding together of the separated maxillae in infancy, though attractive in theory, and at times showing excellent results in practice, have had in the hands of many operators too large a mortality to be undertaken in a routine way. Besides they are applicable only to cases with complete clefts (in which hare lip is nearly always present). In this type of case the early closure of the lip exerts a strong reducing effect upon the cleft, narrowing it to a point where a safe operation can be done, thus, to a considerable extent, eliminating the need of the more dangerous operation. I have observed that the eruption of the teeth approaches nearer to the normal when the closure is brought about by gradual lip pressure. The complete cleft is rarely as difficult to close as the incomplete one, in which this type of operation is not applicable. Here I may state a third rule. Close the hare lip as soon after birth as the child's condition will justify. If the premaxilla protrudes so that the lip cannot be closed over it, fracture it and wire it to the arch at the same time. If the lip can be closed over the displaced premaxilla without undue tension do not fracture the premaxilla, since the lip pressure will do the moulding much more perfectly than can the surgeon. In a year or less the cleft will have diminished and the premaxilla will have, in many cases, taken up its place in the arch. Then close the cleft in the palate. No one operative method can be depended on in all cases. Each case must be treated with a full knownledge, on the surgeon's part, of the merits and defects of all the methods advocated. In secondary operations much ingenuity is required in reaching or approximating a satisfactory result. In some of these the problem is indeed hopeless. Especially is this true after failures in the flap turning operations (e.g., Lane's), where the soft palate is destroyed or so cicatrized that nothing further can be attempted.

Langenbeck's method, with modifications, has in my experience, been applicable to the great majority of cases. In this operation the soft tissues are separated from the bone, brought down and united along the free edges of the cleft. It is

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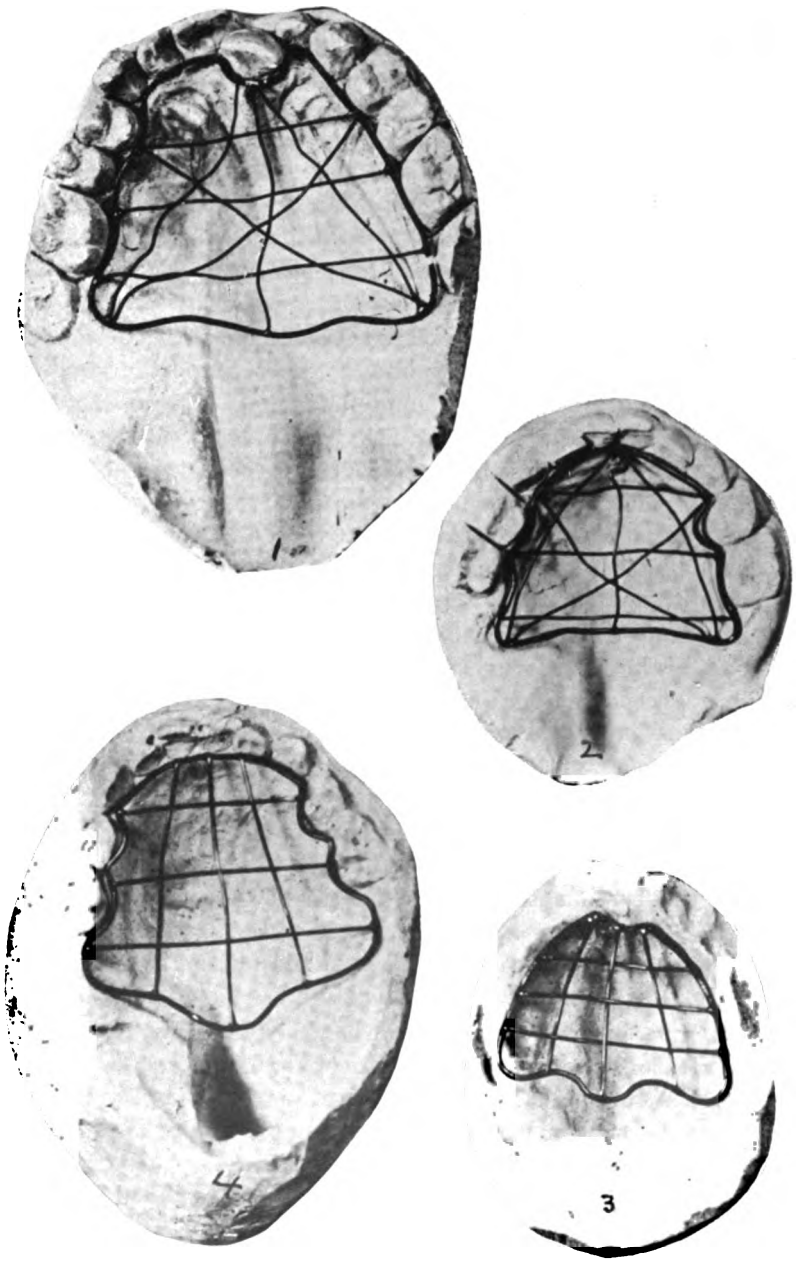

Plaster casts showing obturators in place.

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important that the attachment of the soft tissues to the posterior edge of the rudimentary palatine processes be thoroughly cut away in a lateral direction else the palate will not fall into position. That it in no way injures the soft palate has made this operation deservedly popular for years, and should give it first place in our choice, since when carefully carried through, in the very young, we are justified in hoping for perfect or improved speech. Arbuthnot Lane, modifying Davies-Colley's flap turning operation, gave us the Lane operation. It is a most ingenious and apparently satisfactory method if the closing of the cleft were the only consideration. But knowing that the soft palate is a most important factor in the mechanism of speech, and not simply a partition between the nasal and buccal cavities, we must admit that the Lane operation leaves much to be desired. It restores the form but not the function, and for that reason must always remain a method of second choice. It gives the largest percentage of complete primary closures, and is not difficult of accomplishment to one experienced in this kind of plastic work; yet when it fails it is liable to be an utter and irreparable failure. The palate is so split up by the operation that, if sloughing occurs, it is literally shot to pieces. On the other hand there is no operation which gives such good prospects of a closed palate after failure in other directions. In one of my cases on which three former operations had been done, I succeeded in getting a very respectable looking palate by the Lane method. In very wide clefts with a flat arch it may be the only operation possible and should be done in preference to the Langenbeck, since, in such cases, the latter operation involves too much tension and side cutting of the flaps to give a reasonable assurance of success.

It is my object to here set down my experience in ninety-two cases of cleft palate extending over a period of fifteen years, and to give in detail the technique now employed and to present for trial two new devices employed by me during the past six years. Of these ninety-two cases only sixty-four are available for statistical purposes. (See appended table.)

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To operate immediately after birth as advocated by some seems to me a questionable procedure. Those favoring it hold that normal nursing is established by the closure of the palate and lip. This is true when the patient survives the operation, but the mortality is prohibitive. The feeding of an infant with a complete cleft palate and lip is often a very difficult matter. The child should be carefully weighed before and after nursing to ascertain if any milk has been taken. Where the weight shows deficient feeding, then spoon feeding if possible with the mother's milk, should be instituted. In the event of this failing a small catheter should be passed gently into the mouth of the oesophagus and the milk poured in. Many of these children die of starvation from neglect of the above precautions. In from four to eight weeks after birth the lip and premaxilla can be operated on under a very carefully given chloroform anaesthesia. One week later the child may be put on the breast. It is well to encourage nursing from birth, even if no milk is extracted, as the salivary gland secretion is thereby stimulated and the act of nursing is practiced and retained for future use. It also helps to maintain normal lactation. The age at which the palate should be closed must be determined by the condition of the child. It is quite safe and good practice to operate on some a few months after birth, but in the great majority it should be deferred until the end of the first or beginning of the second year. The mouth, nose and throat must be in healthy condition before any operation is attempted. Diseased or enlarged tonsils should be removed. Too deep an enucleation should, however, be avoided, since the adherence of the anterior and posterior pillars to one another and the cicatricial contraction following draw the divided soft palate downward and outward, increasing the width of the cleft and making subsequent approximation more difficult. The presence of an enlarged post-nasal tonsil, if not diseased, is sometimes an advantage, especially in older children, and in cases where the naso-pharynx is abnormally wide and deep. It makes easier the closing off of the naso-pharynx during deglutition. This closure is also essential in the proper enunciation of some of the speech

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sounds. Therefore, this tonsil should not be removed in all cases. In the presence of sinusitis the operation is almost certain to be a complete or partial failure.

Diseased teeth should be removed or filled. Congential syphilis in all cases should be excluded before operation. Neglect of this caused two failures in my earlier cases before the blood tests were perfected. Operation should be deferred if coryza or bronchitis are present. The general condition of the child should be carefully looked into, and as high a standard of health secured as is possible before the operation. The question arises: Are congenitally deformed children poorer surgical risks than normal ones? I believe that they are. It has occurred to me that there may be some subtle relationship between congenital deformity and the proper balance in the ductless glands system. The only fatality in my series showed status lymphaticus as the cause of death. In several others the shock was all out of proportion to the severity of the operation. In two of these subsequently radiographed there was a strong suspicion of an enlarged thymus.

Operation. I shall here set down only practical points which have come to me during the fifteen years that I have been interested in this work. In the text books may be found the principles of the various operations. It is indeed unfortunate that in these text books we find so little of the intimate experience of the authors, and so small a space devoted to detail on which assuredly the success or failure of the operation depends.

In children between one and two years, feeding should be given within four hours of the operation and should be begun just as soon afterward as food can be retained. A child's resistance ebbs very fast on starvation. In hare lip closures in infants, no feeding should be omitted. The anaesthesia, in the latter operation, should be so light that vomiting ought not to occur during or after operation.

Position of Patient, Operator and Assistants. By far the best position for the operator, both for a good view of the mouth and for his own comfort, is at the head of the patient.

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He sits on a moderately high stool with his feet resting on a high foot rest, and his knees projecting just above the edge of the head of the table. The child's head rests between the operator's knees and is partly grasped by them. In this way the head can be moved laterally or dropped deeper between the knees if more extension is required. The two assistants stand on either side of the table and secure a good view of the field of operation. The anaesthetist sits at the side of the table and administers the anaesthetic through a junker apparatus to the end of which is attached a long bent sterilized glass tube.

The Anaesthetic. Chloroform, if not contraindicated, is preferred. Careful anaesthesia is of great importance. In long operations a moderate degree of shock may occur which is much increased by deep anaesthesia. In fact, in bungling and slow operating with careless anaesthesia I have seen severe shock and even death occur. I have always believed that the anaesthetic, in the majority of surgical operations, may be a more potent cause of death than the operation itself. The anaesthetic therefore should be light, but not so light as to allow vomiting during the operation. Vomiting over the denuded area is, in my opinion, one of the most potent causes of failure to secure union.

Sponging. In lieu of sponging I use suction through a small bent glass tube. The suction should not be strong enough to cause injury to the soft delicate tissues of the throat and palate. Strong suction may produce a very detrimental degree of traumatism. Sponges are used to make compression over bleeding points only, and to wipe off the denuded edges of the flaps before tying the stitches. I have seen the whole throat and soft palate covered with a pseudo membrane following rough sponging.

Traumatism. In no operation is traumatism more productive of fracture than in that of cleft palate. In a dozen ways the friable tissues of the palate may be so injured as to make failure almost certain. During the process of separating the

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flaps from the bone the edge of the instrument must impinge upon the bone and not on the flaps. The flaps are lifted away, not torn away. The nearer the separation approaches to the gingival margin the more is the blood supply to the flap endangered. Therefore, it is important that the separation in the peripheral direction be carried only as far as is necessary to secure coaptation. It is better to leave the flaps with some attachment to the bone and use longer lateral incisions, than to lift them away as far as the teeth with the hope that the lateral incision may be avoided. Before the eruption of the teeth the above does not hold true, since then there is a continuous and good blood supply over the gingival ridge. Therefore, in children under one year, the flap separation may be carried with safety to the level of the apex of this ridge. This is an argument in favor of operating before the eruption of the teeth takes place. Artery clamps should never be used to control hemorrhage except in the rare instance in which the posterior palatine artery cannot be controlled by sponge pressure. Wherever a clamp is used on this tissue there will be a slough later. The flaps should be handled with forceps as little as possible. When the stitches are being inserted a plain forcep may be gently used to hold the edges, but all undue pressure should be avoided. In denuding the edges of the flaps a very sharp thin-bladed knife is used. I prefer an eye knife. The edge is grasped at the junction of the hard and soft palate. The knife then transfixes the tissues just external to the forceps and is slanted from without inward in order to increase the denuded surface. A sawing motion is used, endeavoring to remove the strip in one long unbroken piece. Enough should be taken to secure a good surface but no more.

Coaptation of Flaps. Many and strange are the methods of inserting the stitches. I would condemn all needles set on handles (so-called aneurism needles). They all have a flat surface and a cutting edge, and are large and strong enough for a laperotomy. They leave a long ragged hole. The undue manipulation necessary to their use injures the tissues and

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wastes time. I prefer very small curved and straight needles with trochar points held in an eye needle holder. Some may argue that such a needle holder is too short. Any unnecessary length in the needle holder makes the accurate placing of the stitches that much more difficult. The needle is inserted near the edge and plunged outward so as to get a deep grasp on the tissues. The reverse movement takes place as the needle is brought back through the opposite flap. Stitches so inserted when tied tend to avert the edges of the flaps and bring a greater raw surface in contact. They should be placed about five to the inch. A very important point is not to tie them too tight as allowance must be made for reactionary edema. Very fine silkworm gut (ophthalmic gut) and coarse horse hair are perhaps the best suture materials, though I have used Pagenstacker's thread and Lillianthal's silver wire with equally good results. Where time is a consideration the continuous suture may be used with or without locking each stitch. When this is employed I use one thread for the hard and one for the soft palate. Before each stitch is tied the raw edges should be wiped with a small sponge wet in saline to remove all bloodclot.

Methods of Relieving Tension. This is perhaps the most difficult problem that confronts us, as is evidenced by the variety of opinions and methods advanced. To relieve tension without unduly limiting the blood supply must be constantly kept in mind. In some of my earlier cases I violated this principle, with the result of seeing some perfect looking palates after operation, fall to pieces in a few days. I believe now, that these failures were largely due to placing too much confidence in the lateral tension relieving plates advocated by some surgeons. It is my opinion that the principle of these plates, though perhaps correct in theory, is ineffective and even injurious when applied to this particular operation. We must remember that we are dealing with a tissue not much stronger than thick wet paper. To secure a holding grasp on this tissue with as thin an edge as even the large silver wire used, is impossible. As the plates are applied the direc-

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tion of the lines of force are not upon the surface of the palate as supposed, but almost entirely on the stitch holes. If the plate is tilted so as to bring the force more against its surface, then its distal edge impinges against the flap, cuts off the blood supply and causes sloughing. Moreover its under surface furnishes a fine retainer for septic material, which coupled with the inevitable traumatism already done, opens still wider the avenue to failure.

The advantage secured by preserving the posterior palatine arteries is so great that every effort should be exerted toward this end. It is, however, frequently impossible to sufficiently lower the flaps without carrying the separation beyond the emergence of these arteries from their foramina. Unfortunately it is just at these points of emergence that the lateral incisions do most good in taking the strain off the weakest point in the line of union (just anterior to the soft palate). Here the flap is so thin, that an edge to edge approximation is not sufficient to secure union. The edges must be everted so that the upper raw surfaces lie together. To secure this without tension the lateral incision must be carried around the curving edge of the posterior end of the alveolus. I have found that if this incision is made a little internal to this curving edge that some branches of the artery are left uncut and a better blood supply is probable, or the incision may be made in front and behind the location of the artery. It is well to insert as many stitches as possible before making the lateral incisions. The approximation is done in front and then behind the maximum tension. Then the incisions are made and extended as each stitch is drawn up. Excessive side cutting is thus avoided. It has been observed that the lateral incisions tend to come together and close long before the central line of union is secure. To prevent this tape has been passed from one incision across to the other and secured with the object of holding the tissues to the centre and preventing lateral closure. The tape is objectionable because it cannot be kept clean. I first tried silver wire but it cut into the flaps. Then I devised flat-faced small retractors made of silver.

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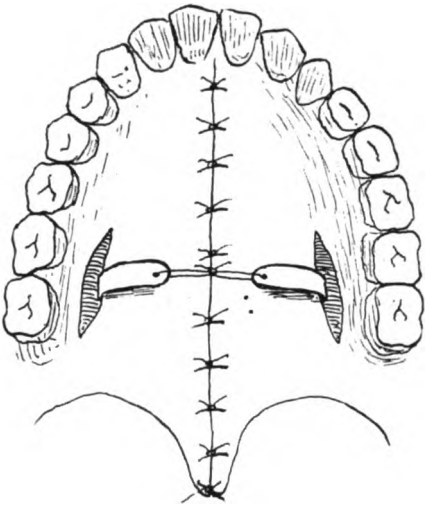
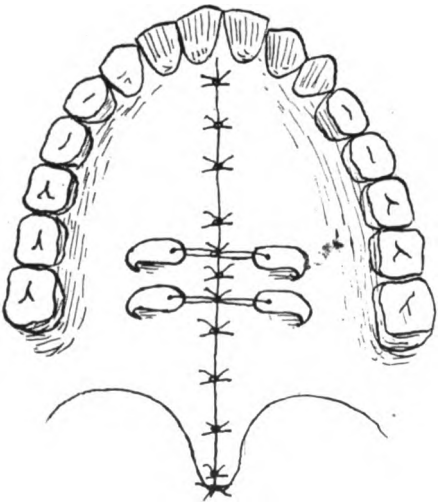
(See diagram.) These can be made in any width desired. The arms are about equal in length, the object being to secure a



Retention retractors.



Retention single hooks.

good grasp on the inner edge of the lateral incision. The arm on the palate or buccal side has an eye in its end to which a

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strong linen thread is secured. The threads of the two retractors are tied and drawn together sufficiently to take all tension off the central line. The retractor can be made for each case by the surgeon from virgin silver plate rigid enough to maintain its shape when bent. It should be of sufficient width to insure it against cutting into the edge of the lateral incision. For cases where lateral incisions are not needed, but where some tension is feared on account of post operative reaction, I have found very serviceable the single or double hooks shown in the diagram. These have flat faces, sharp points and well cured hook ends, so that they can be plunged through the flap at any desired point and will not pull out of place. The buccal arm of the hook has a small eye for the attachment of a linen thread. This is tied to its fellow of the opposite side sufficiently tight to relieve central tension. I claim for these retractors and hooks facility of application and cleanliness. The flat surface impinging against the soft palatine tissues does not cut its way out as does the silver wire. The amount of tension can be better judged when tying the linen thread than when twisting the stiff silver wire formerly used for the same purpose. Tongue pressure as a factor in producing strain has, so far as I am aware, been overlooked. That it is a potent cause of failure needs no proof when we consider the amount of upward force exerted by the tongue in each act of swallowing and that this act takes place every few minutes, more or less unconsciously, and quite independent of the taking of food.

For several years I have been using a device for the relief of this strain and now feel justified, on account of the good service it has rendered me, in presenting it for trial by others. A plaster cast of the palate is taken, and on this cast is made an obturator which fits accurately along the inner margin of the gingival ridge in infants and along the bases of the teeth in older children. The obturator is made of platinoid wire, heavy at the rim and light inside. The wires are cross-barred and soldered at the points of crossing. (See diagram.) After the completion of the operation the obturator is sewed

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to the gums in infants and tied to the teeth in older children. Three points of attachment are sufficient, two well back on the sides and one in front. This is left in until the stitches are removed. It in no way obscures inspection of the wound or interferes with cleanliness. I use it in all cases where the cleft extends beyond the soft palate. It should be made flat or curved slightly upward, and should not project far enough back to impinge against the downward curve of the soft palate.

The After Treatment. If in dealing with this I were limited to one statement, I would say; secure rest of the operative field as far as is possible. Of course absolute rest in this situation is impossible, but the principle should be kept in mind during the whole after treatment. It is an excellent plan to place the child in a hospital several days prior to operation, under a nurse trained in the care of children, in order that proper control be established. Many children are spoiled in their homes by too much indulgence. We have all observed how angelic those unruly ones become after even a few days under hospital regime. In no operation is control more important if we wish to secure, after operation, the maximum of local surgical rest. Talking is prohibited in older children. Every effort should be made to prevent crying in younger ones. In these the hands should not be tied as is sometimes foolishly done. But movements in the direction of the mouth should be limited. The mother should stay with the younger children and as a rule must receive a course of training as well as the child prior to the operation. If a very young child is insufficiently fed it will cry contsantly; therefore there should be no starvation with the object of preventing swallowing and the contaminating of the mouth with food. In some children carefully done gavage (inserting the catheter through the nose after a spray of a weak solution of cocaine) succeeds very well. When much resistance is met with on the above method mouth feeding by spoon is best. Milk, oatmeal, jelly, white of egg, milk sugar are the best foods. After feeding, a drink of sterilized water should always be given. Sleep must be secured by opiates or sedatives if needed. In fact the more the child

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sleeps between feedings the better in the forty-eight hours following the operation.

In conclusion I would say that this operation should be in the hands of men experienced in plastic surgery, men trained in work requiring fine manipulations. Therefore I turn with hope for betterment in this difficult and discouraging field to the rhinologist and laryngologist of the future.

Age at Operation.

Under three years	20
Three to six years	18
Six to ten years	9
Over ten years	17
	64

Table of Results.

Complete failures	7
Partial failures	6
Closed by second operation	12
Closed by third operation	1
Closed spontaneously after partial failure	2
Deaths	1
Closed by first operation	37
Ultimate complete closures	50
Speech normal	17
Speech improved	17
Speech not improved	30
	64

In the fifty complete ultimate closures speech was normal or improved in thirty-four, unimproved in sixteen. In two not old enough to be tested the prospects are good.

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No.	Age.	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
1	2½	Soft Palate.	Movable soft palate.	Speech good.
2	10	Hard and soft palate.	Complete closure, some rigidity of palate.	Speech improved (no training).
3	6	Hard and soft palate.	Hole remains at junction of hard and soft palate.	Refused further operation Speech unimproved.
4	5	Soft and one-half hard palate.	Absolute failure due to low arch.	Child defective.
5	3	Soft and two-thirds hard palate.	Completely closed.	Speech good.
6	2½	Complete hard and soft palate with hare-lip.	Completely closed by second operation.	Speech fair though carefully trained.
7	3	Soft and notch in hard palate, very wide cleft, flat arch.	Complete closure.	Palate tense, speech fair, K sounds defective.
8	4	Complete hard and soft.	Complete closure.	Deaf mute, good flexible palate.
9	10	Complete hard and soft.	Complete closure; soft palate short.	Speech bad, extreme type of malocclusion.
10	1½	Complete hard and soft. Double hare-lip.	Complete closure.	Speech good, incisors badly turned backwards.
11	9	Hole left by operation elsewhere in center of palate, soft palate fibrous.	Closed hole and palate, no uvula.	Speech but slightly improved.
12	1¼	Complete hard and soft.	Complete closure.	Speech perfect.
13	7	Soft and one-half hard low arch, wide cleft.	Hole at junction of hard palate hole closed spontaneously in six months.	Speech but slightly improved on account of tension, no palate due to fibrous contraction.
14	9	Soft palate only.	Complete closure.	Speech fair.
15	19	Soft and hard palate.	Complete closure after second operation.	Speech improved. I gave her personal teaching in clinic for one year.
16	12	Soft and one-half hard palate.	Complete closure.	Speech not improved, mentally defective.
17	2½	Soft and part of hard, rest of palate very thin, no bone.	Complete closure.	Speech good.

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No.	Age.	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
18	9	Complete cleft of hard and soft palate.	Small hole left.	Refused further operation, wears obturator, spech unimproved.
19	12	Soft and three-quarter hard palate.	Complete closure after second operation.	Speech improved, K and S sounds defective, intelligent, still improving.
20	2	Complete hard and soft with single hare-lip.	Complete closure excepting for very small hole near incisors.	Speech good, some trouble with K sounds.
21	5½	Complete hard and soft palate.	Complete closure with flexible soft palate.	Speech much improved, K and G sounds defective.
22	13	Complete hard and soft.	Lateral hole.	Obturator used, speech slightly improved.
23	9	Complete hard and soft.	Complete failure after two operations.	Child very delicate. T. B. glands in neck. Father had syphilis. Wassermann negative in child.
24	3	Complete hard and soft palate.	Hole in soft palate, closed by second operation.	Speech improved, no training.
25	12	Soft palate only.	Complete closure.	Speech not improved.
26	19	Soft and one-half hard palate.	Soft palate closed.	Chronic sinusitis and discharge precludes further operation, obturator, speech not improved.
27	4	Complete hard and soft palate.	Complete failure. Lane operation done one year later. Complete closure.	Speech not improved. Child now six-and-a-half years old.
28	14	Wide cleft of soft and one-quarter of hard palate. Low arch.	Complete failure.	Cleft was wide. Lane operation should have been done in this case.
29	6 mos	Complete cleft of hard and soft palate and hare-lip	Complete closure of palate. Lip was closed at sixth week.	Speech normal for age.
30	1¼	Soft and one-half hard palate.	Complete closure after second operation, good flexible soft palate.	Speech not quite normal for age.

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No.	Age.	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
31	6	Soft palate and part of hard.	Small hole at junction of soft and hard palate closed by second operation.	Speech improved, no training.
32	1	Complete hard and soft palate with double hare-lip.	Complete closure.	Too young to list speech. Palate flexible. Prospects for speech good.
33	6	Soft palate only.	Complete closure.	Speech not improved, reason not evident.
34	1	Complete soft and hard palate, low arch.	Three holes in palate.	Lane operation done; practically a complete and irreparable failure.
35	5	Soft palate.	Broke down completely on second day. Child ran septic temperature for two weeks.	Refused further operation.
36	1½	Soft palate only. Child very fat, large hips and thighs, no hair, blond, florid. Mother 42 years old, first child.	Child died suddenly six hours after operation (lasting one-half hour, chloroform anesthesia).	Enormous thymus found, evidently thymus death.
37	1½	Complete hard and soft palate.	Soft palate broke down after first operation, also anterior part of hard palate. Soft palate united after second operation. Small hole just behind incisors. Closed spontaneously in four months.	Speech satisfactory (by letter).
38	2½	Complete hard and soft palate. Two previous operations, great thickening of tissues.	Two operations done elsewhere; first at ten months, second at eighteen months, both failures. Lane operation completely closed palate. Soft palate tense and fibrous.	Speech so far unimproved (four years old). Prospects for good speech poor.
39	17	Oval hole junction of hard and soft palate. Operation elsewhere at three years.	Hole very small after operation, closed two months later.	Speech improved.
40	13	Complete hard and soft palate.	Soft palate only united.	Speech not improved. Further operation refused.
41	11	Soft and half of hard palate.	Complete closure, good soft palate.	Speech slightly improved after considerable training.

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No.	Age.	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
42	2½	Soft palate, previous operation by another surgeon, in first year.	Hole remains at junction of hard palate, size large.	Speech fair.
43	9	Soft palate.	Complete closure. Good flexible palate.	Speech improved, training poor.
44	4	Soft palate.	Complete closure, palate tense.	Speech slightly improved.
45	5	Soft and two-thirds hard palate.	Good soft palate.	Speech much improved.
46	15	Operation done elsewhere, leaving large central hole. Lane operation done.	Complete closure, soft and hard palate fibrous. No mobility.	Speech not improved.
47	11	Wide cleft soft palate, low arch.	Lane operation. Good looking palate.	Speech unimproved after careful training.
48	1	Complete hard and soft palate, harelip, single.	Complete closure.	Speech normal for child of his age (by letter).
49	3	Soft palate, one-half hard, very flat arch.	Lane operation, palate closed, post edge of soft palate notched on one side, tissues tense.	Speech bad, child now four-and-a-half years.
50	20	Complete soft and hard palate, high arch.	Closed after second operation.	Unimproved after one-and-a-half years' training.
51	14	Hard and two-thirds soft palate.	Complete closure.	Speech not improved. Child mentally defective.
52	6	Complete hard and soft palate. Lip closed at second year elsewhere.	Operation by Langenbeck method. Complete failure. One year later Lane operation closed cleft and gave a cicatrical soft palate.	Speech not improved one year later.
53	4	Soft palate, slight notch in hard palate.	Complete failure due to syphilis, not recognized before operation.	Refused further treatment.
54	2½	Complete hard and soft palate.	First operation only soft palate closed. Second operation left hole behind incisors. Closed by third operation.	Severe type of malocclusion. Speech not much improved after one year home (poor training).
55	2½	Soft and one-half hard palate.	Small hole at junction of hard palate closed by second operation.	Speech improving, good training.

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No.	Age.	Extent of Deformity.	Ultimate Result of Operation.	Remarks.
56	4	Soft and hard palate, previous operation at two years of age, failure by another surgeon.	Lane operation done, complete and hopeless failure.	No further operation possible.
57	1½	Soft palate.	Complete closure. Movable palate.	Too young to judge if speech prospects good.
58	18	Hole at Junction of hard and soft palate, bifid uvula.	Hole reduced one-third former size. Second operation, flap turning closed hole.	Father states that speech is improved (by letter).
59	3½	Soft and one-quarter hard palate.	Complete closure. Good soft palate.	Speech seems normal for age.
60	12	Hard palate,. Soft palate closed elsewhere four years previous.	Lane operation, good closure, soft and hard palate fibrous and tense.	Speech not improved.
61	5	Soft and hard palate.	Complete closure, except in uvula, still bifid.	Speech improving.
62	6½	Soft and hard palate, almost to incisors, V-shaped cleft, low arch.	Complete closure. Tissues very thin at junction of hard and soft palate.	There is some liability of this tissue breaking down later, speech much improved.
63	6	Soft and one-third of hard palate.	Complete closure, tense palate.	Speech slightly improved.
64	4½	Soft palate.	Complete closure, soft palate, somewhat tense.	Speech not improved to date.

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DISEASES OF THE SALIVARY DUCTS.

BY CARL E. MUNGER, M.D.

The ducts of the salivary glands present many points of interest whether affected by disease or injury, whether acting as highways of infection to the glands or as channels of escape for diseased products originating in the glands themselves, or it may be that the ducts themselves are the seat of the diseased condition, or they may be conjointly affected with the glands. In all of these conditions we have to do with the important tracts that play so marked a role in disordered conditions of the salivary system, and where patency is so necessary for the proper discharge of the secretions forming the saliva. It is indeed strange, not that the glands and ducts become affected by the entrance of disease bearing micro-organisms, but that there is so seldom infection and that the variety of infection is so limited, and that really we have but a few diseases either of the ducts or of the glands themselves.

When we call to mind what numerous pathogenic bodies are present in the mouth at all times and how receptive the buccal cavity is for all sorts and conditions of diseased emanations from the outside world, it is, I repeat, strange indeed that we have such a limited number of diseased conditions of the ducts and glands of the salivary system. It will be best perhaps to take up in detail the troubles arising in connection with Stenson's duct and the parotid gland, and later conclude with the diseased conditions that arise in the ducts of the sublingual and submaxillary glands. Stenson's duct is the name given to the excretory duct of the parotid gland, which, beginning as small branches in the gland itself, that unite in one common trunk, runs from the anterior border of the gland, passing over the masseter muscle, and piercing the buccinator opens into the buccal cavity on the inner aspect of the cheek opposite the second molar. The walls are quite thick and consist of an outer fibrous coat with contractile fibers, with an inner coat lined with columnar epithelium. Its course is indicated by a line drawn from the lobule of the ear to a point midway

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between the ala nasi and the margin of the upper lip, and lies above the facial nerve. The following is a fairly good classification of the affections of the duct, which are either primary or secondary: The primary diseases of Stenson's duct are (a) an inflammation, acute or chronic; (b) formation of calculi in the duct; (c) injuries to the duct. The secondary affections are (a) occlusions of the duct following acute inflammation; (b) following excessive salivation; (c) impaction of calculi; (d) stricture due to healing of wounds; (e) ulceration of the duct or abscess in the duct due to impacted calculi; (f) stenosis and ulceration due to impaction of foreign bodies; (g) cystic dilatation due to simple inflammation of cicatricial obstruction and suppuration; (h) fistulae. An acute inflammation of the duct which is strictly primary is due to exposure to cold or extension by continuity of an existing inflammatory condition of the mouth.

The following is a typical case: Mrs. S. G. woke up on the 20th of June, 1891, after exposure to cold and wet the day before on an ocean steamer; she found that she could not open her mouth wide, and that she had a swelling in front of the right ear, and in addition presented the symptoms of an acute cold; her eyelids were swollen and her throat was sore. She came to my office September 25, and said that even at that time her head and throat were all filled up. She also complained of a feeling of fullness in her right ear, and stated that her mouth was apt to be dry. Examination showed that her ear was normal. There was a large hard swelling of her right parotid, with no especial tenderness. There was also a hard cord-like feeling along the course of Stenson's duct. The duct would admit only a small probe and for only a short distance at first, but repeated trials finally were successful, so that the small probe could be introduced the whole length of the duct, and gradually probes of increasing size were passed until the duct was thoroughly and permanently dilated, with the result that the flow of parotid saliva was normally established and the gland reduced to its proper size.

A calculus may form either in the duct itself or in the parotid

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gland, or there may be more than one present. This stone is formed of phosphate and carbonate of lime, and although this condition is more common in the ducts of the submaxillary and sublingual ducts, it is not at all uncommon in the ducts of the parotid gland. The color is a dirty yellowish white, and its presence may be felt either by palpation or by exploring with a probe passed through the duct to the point of obstruction, or a hypodermatic needle may be plunged through the duct wall and the nature of the swelling determined by its feeling of hardness.

These stones in the duct itself form only where the lining[3] of the duct has been roughened or thickened, or a partial or complete stenosis has resulted with an accompanying decomposition of the parotid saliva. Or, as has been stated[4] a plug of mucus containing some bacteria is retained within the duct and forms a nucleus for the successive deposits of inorganic salts, principally phosphate and carbonate of lime.[5] Sometimes suppuration may occur around these calculi, with the formation of an abscess which may discharge into the mouth or externally forming a fistula. When the stone is in the duct itself the diagnosis is ordinarily simple, but if in the substance of the gland it may be extremely difficult, and in this case a radiogram may be of great assistance. When the calculus is in the duct itself it is easily reached through the mouth, the duct incised, and the stone removed by forceps or manipulation. When, however, the stone is in the substance of the parotid gland, the calculus itself should be excised and the wound closed to prevent the formation of a fistula, care being always exercised to avoid the facial nerve, where injury would bring about that distressing and disfiguring condition, facial paralysis. Injuries to Stenson's duct may be due to the traumatism of operation or to accidental injuries resulting in laceration or cutting, or contusing the duct. There may be a complete severance of the duct with the whole substance of the cheek wall, or the wound may be from the outside of the face down to and including the duct, but not the buccal surface. Or the injuries may be from within the mouth, and affecting

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the duct, but not the skin, or there may be a contusion of the parts with laceration of the duct without either an external or internal wound, in which case there will be a swelling of the cheek due to the infiltration of saliva into the cellular tissue of the cheek. One of the earliest mentions of a salivary fistula is by Ambrose Paré, in the sixteenth century, as follows:

"Cértait un soldat qui avait reçu un coup d'éprée au travers de le mandible supérieure, la plaie guérit,il ne restait qú un bien petit trou pres de la conjunction de la mandible inférieure a la mandible supérieure non plus grand qú a mettier la teste d'une épingle duquel luy sortait en parlant ou maschant, grand quantité d'eau fort claire et que j'ai souventes fois veue."

There may be a single fistula or there may be multiple fistulae, the latter when the trouble is in the parotid gland itself, and the discharge of fluid is from the gland itself. I have recently had a striking example of this where an operation for removal of the cervical glands had been performed months before, and during all the time from the operation to the patient's visit to my office the wound had never entirely healed, and there was a continued dribbling of thin discharge which excoriated the neck. The parotid was at the same time enlarged, and it was only after several weeks' treatment that the multiple fistulae healed and the gland returned to its normal size, this after numerous cauterizings of the fistulae and a thorough dilation of Stenson's duct. The treatment of fistula of Stenson's duct differs according to the character and seat of the lesion. When the wound of the duct is from within the cheek, although a fistula ensues, the condition is of practically no importance, the parotid saliva simply escaping through the false passage into the mouth, and the anterior portion of the duct becomes useless and discarded. Should the whole thickness of the cheek be cut through, the outer or cutaneous surface should be carefully sutured and an attempt made to get healing so that the saliva may escape through the internal fistula into the mouth. Of the duct fistulae there are two varieties: first, where the fistula communicates with the duct as it lies over the masseter muscle (the masseteric [11]); second, when it

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lies in front of the anterior border of the masseter muscle (the buccal). When the fistula involves the anterior portion of the duct the methods of Langenback and Riberi,[13] which are alike, can be utilized. The part of the duct behind the fistula is exposed and dissected out, and passed into the mouth through a perforation made in the cheek. When a large portion of the duct is destroyed, or there is a lot of cicatricial tissue, Dejardin and Guilikers[14] perform the operation in this manner. The outer portion of the canal, together with the masseteric prolongation of the parotid gland is exposed, then the opposed margins of the gland and masseter muscle are separated; after this the inner surface of the masseter is detached from the outer surface of the ascending ramus of the jaw, and the exposed and dissected portion of the gland is thrust between the masseter and the bone through an orifice made in the buccal mucous membrane, to the margins of which it is fixed by a suture. Sometimes a fistula of the duct may be treated by inserting a silver suture inside the cheek, the free ends being about one-eighth of an inch apart, the suture closed and tightened until the included portion of the cheek, sloughing out, forming an artificial opening for escape of saliva into the mouth, at the same time closing the external opening by application of caustics or use of the galvano-cautery or by freshening the edges of the fistula and closing with sutures. One of the oldest methods of curing a fistula of Stenson's duct is passing a seton through the whole thickness of the duct and the two ends tied at the angle of the mouth, this moved back and forth frequently until a flow of saliva is established toward the mouth; then the seton is removed and the external wound closed. Whatever method is used, patience and perseverance must be exercised, and every means tried to insure, if possible, a curing of this most distressing condition, which may be so bad as to make life miserable for the sufferer. Occlusion of the parotid duct may follow as the result of adhesions subsequent to acute inflammation or violent salivation—this, of course, rarely in these times, as salivation is accidental and not premeditated as in olden days. This condition may also occur after scarlet fever or diphtheria

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or gangrene of the cheek. The healing of wounds of the cheek may produce a stricture of the duct, or the duct may be blocked up by the impaction of a calculus, or a stenosis may result from the ulceration or abscess due to impacted calculus, or it may be due to the impaction of foreign bodies other than a stone, such as hair [7] in duct, fish bone,[8] bristle from tooth brush, small bearded tail of a chestnut, etc. Cystic dilatation of the duct may be due to simple inflammation [9] or cicatricial obstruction and suppuration, or from the presence of a calculus, causing ulceration and thickening of the walls, or it may occur as an occupational disease, in glass blowers or performers on wind instruments. These tumors are gaseous,[10] the duct becoming infected with the air may be mixed with the saliva and pus. Further, if plugs of mucus [11] or small calculi obstruct the exit of the duct, they may cause an accumulation of fluid which if it persists may result in the dilation of all the ducts emptying into the obstructed one, and convert them into an epithelial lined cavity.[12] Running along the floor of the mouth between the teeth and the tongue parallel to the alveolus is the sublingual ridge, formed by the sublingual gland. This gland lies on the mylohyoid muscle, with the lower jaw in front. On each side of the frenum on the sublingual ridge is a papilla into which the duct of the submaxillary gland (Wharton's duct) opens. Opening into the same Wharton's duct, or by a separate duct into the same papilla, is the duct of the sublingual gland, called the duct of Rivinus or Bartholini. The superficial portion of the sublingual gland opens on the sublingual ridge to the outer side of the papilla by a number of small ducts, called the ducts of Walther.

A calculus in the submaxillary duct or gland[13] occurs more frequently than does one of the parotid gland or Stenson's duct, and this has been attributed to the presence of mucin in the secretion of the submaxillary gland. When the calculi form in the gland itself they are apt to be very persistent, and the number of stones which may be removed is at times very large, as in one of my cases—a young woman went through a period of about a year during which many calculi, varying in size, were shed, after the parts became softened, so that

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incision was demanded, and through the incision a calculus could be removed; in fact this happened so frequently for months that she seemed to be a veritable quarry. After the lapse of time she had no further trouble, nor has she had for about three years. More frequently the stone forms in the sublingual duct itself, and as described by Howard," presents four types of clinical features. First, a class of cases in which the patient complains of a hard swelling in the floor of the mouth, but without any subjective symptoms. Then there is a set of cases where the submaxillary is acutely swollen and painful, and the patient seeks relief shortly after the onset of the symptoms, and in these cases there is sometimes a spontaneous evacuation of the stone. Then, again, occur those cases in which there are recurrent attacks of swelling of the gland, usually during eating, at which time the gland becomes tender and painful, although the patient may have freedom from uncomfortable symptoms for weeks, and, lastly, there is the type of cases where suppuration occurs around the stone and an abscess forms which may discharge into the mouth or even externally, forming a fistula. Frequently a stone imbedded in the submaxillary duct is a source of much irritation; the parts get thickened and tender, and there may be a discharge of pus, appearing at the papilla of Wharton's duct. The breath may be foul and there may be a marked constitutional effect from the absorption of pus and a fear on the patient's part that he is suffering from a case of malignancy. I have recently had such a case, that had been treated for months; the man had lost flesh; at the time of this visit to my office he was nervous and anxious about his condition, and fully expected that the tender swelling in the floor of his mouth was a cancer. And he had reached a point where it was almost impossible for him to attend to his daily work. Simple incision and removal were all that was necessary; the wound healed quickly and he was back at his work in less than a week, a well man. One woman came to me much exercised over a sore that she had in the floor of her mouth, fully thinking that she had a cancer, and had kept away from doctors for fear of being told that it was malignant. There was a thickening under the tongue, a foul

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sore covered with a grayish exudation. In this case she had undoubtedly had a calculus in the submaxillary duct which had caused an inflammation of the duct, an abscess had formed, broken and the stone had come out without her knowledge, and the sore had become infected from her mouth. Excision of this mass resulted in quick healing and a complete cure. When the stone is situated in the submaxillary gland it may be well to remove the gland, but if in the parotid gland it is the stone that should be excised and not the gland, on account of the facial nerve situated in it. In general it may be stated that salivary calculi are [18] formed by deposits of earthy salts (chiefly calcium phosphate), from the saliva in the excretory ducts leading from the gland or in the gland itself. These stones may have nuclei, as, for instance, in Tilnig's [19] case, where a calculus three centimetres in length was taken from Wharton's duct, which had in its center a hair, or as in Dr. Selenkow's case, where the center of the concretion was masses of leptothrix. Foreign bodies may get into the duct, as in the case of a boy, sixteen years of age, who thought he had got a piece of oats stuck in his tongue, in July, 1910. The submaxillary gland was enlarged and there was a hard swelling along the course of the submaxillary duct, and in March, 1911, a piece of straw came out spontaneously, the symptoms entirely disappearing. Another case was one where there was a swelling of the submaxillary gland, which was increased on taking acids. Removal of a stone from Wharton's duct relieved the symptoms. Of the various affections of the salivary apparatus, a not uncommon one is the disease known as ranula. This, according to one definition, is a "fluctuating semi-transparent tumor under the tongue, resulting from accumulated saliva and mucus in the ducts of the sublingual gland, or from the independent development of a cyst in the sublingual region." This somewhat indefinite statement as to the pathology of this condition is in keeping with the two schools of opinion as to the seat of the affection. Davis [20] says that a ranula is a name given to a cyst occurring in connection with the salivary glands, the sublingual or submaxillary, and when the duct of either is obstructed, as by a calculus, it will form a cyst which

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would bulge into the mouth beneath the tongue and be called a ranula. The sublingual gland is usually the starting point of these cysts, and will be seen that as they enlarge they push the ranine artery, with the tongue backward, and are only covered with mucous membrane. Butlin[20] states that a ranula is a dilatation of acini or ducts of mucous glands beneath the tongue, and not a dilatation of Wharton's duct, and worked out by Von Rocklingnausen and Sonnenberg in this manner. They claim that the gland which is diseased is the Blandin-Nuhn gland, a small mucous gland situated on the under surface of the tongue, a little to one side of the middle line, and the cyst is formed by the dilatation of one or more of the acini of this gland. That any smooth tumor under the tongue anteriorly is apt to be loosely diagnosed a ranula is well illustrated by a description of ranula by Dorsey,[21] 1823:

"This consists of a tumor under the tongue containing a glairy fluid resembling the white of an egg. It is supposed to proceed from an obstruction in the salivary duct. The tumor sometimes contains, instead of the viscid fluid that has been mentioned, a purulent matter, and sometimes a calcareous concretion." In this description he does not separate a true ranula, which is a dilatation of one or more of the acini of the Blandin-Nuhn gland, and a dilatation of Wharton's duct or of Ravinus or Bartholini duct. If the swelling is a true ranula, passing a probe into Wharton's duct will go, not through the swelling, but beneath it, and the swelling will not be diminished in size. Really the only conditions that might be confounded with a ranula are either a nevus or a dermoid cyst. A nevus is not fluctuating, and the blood is easily pressed out of the swelling and the swelling is opaque. The dermoid cyst is doughy in feeling, and there is a lack of translucency, and forms a hard swelling behind the jaw bone. Usually with a ranula there is absence of discomfort unless the swelling is of considerable size, while with a dermoid cyst there is discomfort in speaking or eating, with a constant feeling of fullness in the mouth; it is yellowish in color, there is a swelling behind the chin rather than under the tongue, and has the usual contents of a dermoid cyst, cholesterine, epithelial cells, fatty debris, rarely

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hair and with extreme rarity bone and teeth. In the study of diseases and pathological conditions of the salivary ducts one can but be impressed with the extreme rarity of malignant affections of these structures, and with the readiness with which most of the untoward conditions can be remedied, although each case must be dealt with according to its requirements, and not according to any general rule. Yet many of these cases must be cured only after a prolonged course of treatment before relief can be obtained, and I am sure no class of cases will give more satisfaction both to surgeon and patient than these same salivary affections, and especially in the cure of external salivary fistulae.

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Obituary.

ARTHUR AMES BLISS, M.D.

Arthur Ames Bliss, son of Theodore and Mary Wright Bliss, was born in Northampton, Mass., July 13, 1859. His father was a publisher and bookseller of Philadelphia. The subject of this memorial received his early education at a private school in Philadelphia. Later he entered Princeton College where he graduated in 1880, taking the degree of A.B., and subsequently that of A.M. He at once began the study of medicine at the medical department of the University of Pennsylvania, graduating in 1883. Having obtained the degree of M.D., he served for one year as interne at the Philadelphia (Blockley) Hospital. Following this he spent a year abroad, making a special study of the diseases of the ear, nose and throat and dividing his time between the clinics of Vienna, Berlin, Heidelberg and London. Soon after his return to Philadelphia, in 1885, he entered upon general practice, but within a few months became an assistant of Dr. J. Solis Cohen at the Philadelphia Polyclinic. Dr. Bliss organized and established the ear, nose and throat clinic of the German Hospital in Philadelphia and was elected laryngologist and otologist to that institution. This position he held for about ten years, when owing to the pressure of other work he relinquished it but retained the children's department, the Mary J. Drexel Home, and was made consulting laryngologist and otologist to the German Hospital.

At the time of his death, in addition to the above Dr. Bliss held the following positions: Consulting Laryngologist and Otologist to the Pennsylvania Institution for the Deaf and Dumb; Laryngologist to the Chestnut Hill Hospital; Consulting Laryngologist to the Epileptic Hospital. For several years, and until the death of the late Dr. Harrison Allen, Dr. Bliss was assistant to Dr. Allen in all of his surgical work.

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Dr. Bliss was elected a fellow of the American Laryngological Association in 1883 and one of its vice-presidents in 1900. He was also a member of the following societies: The Philadelphia County and Pennsylvania State Medical Societies, The American Medical Association, Fellow of the Philadelphia College of Physicians, and at the time of his death chairman of its section of Otology and Laryngology.

He was married in 1893 to Miss Laura Neuhaus, of Vienna, Austria, who survives him.

Of non-medical subjects he arranged and edited an autobiography of his father which was published in 1911.

While an interne at the Philadelphia Hospital he kept notes of interesting occurrences and of the men connected with the hospital. This material he had arranged for publication. It will appear in the forthcoming Annual Report of the Philadelphia Hospital.

The above record, implying as it does the unceasing devotion of unusual talent carefully and generously trained to the highest and most altruistic ideals, is an eloquent tribute to the character of the man. Quiet, refined, unselfish, he was universally respected as a physician and beloved as a friend.

CHARLES E. BEAN, M.D.

Dr. Charles E. Bean was born in the State of Kentucky in 1854. Having received a good preliminary education he decided to become a physician and entered the medical department of the University of Louisville, from which institution he received the degree of Doctor of Medicine in 1877. Following his graduation he served in the Indianapolis Hospital for about one year. In August, 1879, he was appointed Assistant Clinical Lecturer on diseases of the chest in the University of Louisville. He soon began to appreciate the importance of the field upon which he had entered and the necessity for better training and wider experience. Diseases of the throat especially appealed to him, and after struggling unsuccess-

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fully to learn something of them without a teacher, he realized the futility of the effort and started upon an entirely different basis, to the end that, at whatever cost, he might become a master of the art. He therefore resigned his position at Louisville, gave up what practice he had acquired, closed his office, and in the Spring of 1880 came to Philadelphia, attracted by the prestige of Dr. J. Solis-Cohen, unquestionably then as now, the foremost authority of the time. Obtaining an introduction to Dr. Cohen he called upon him and explained his desire to perfect himself in laryngology, requesting that Dr. Cohen accept him as a private pupil. Dr. Cohen was at that time teaching and lecturing at the Jefferson Medical College. With this work and with his practice his time was too fully occupied to make it possible to give private instruction. Dr. Bean was therefore referred to the college. This, however, did not satisfy him, because entirely insufficient for his needs. Again he importuned Dr. Cohen without success. Still hopeful he made a third attempt, in the course of which he showed such an intense desire to learn, and urged his cause with such earnestness that Dr. Cohen after much consideration of the matter finally advised the young applicant that to really become proficient in laryngology one should study and work for a considerable length of time with the ablest possible master. Desultory courses, taken here and there could never give the training necessary for the actual mastery of the subject.

Accordingly Dr. Cohen arranged to accept Dr. Bean as his office assistant, giving him at the same time all possible instruction in the technique of the department, guiding his reading and making it possible for him to live in Philadelphia by giving him a sufficient salary. The agreement was for two years. It was actually extended to three, at the end of which time Dr. Bean parted from his generous patron upon conditions of warmest friendship, and a thoroughly educated and expert specialist.

Meanwhile, in 1880 he had become a fellow of the American Laryngological Association. At the suggestion of Dr. Cohen, having finished his studies in Philadelphia, Dr. Bean removed to St. Paul, Minnesota, where he took up his residence and

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soon established himself as the leading authority of that section, and acquiring an important and extensive practice, which he conducted with marked professional ability and success. An excellent instructor, he was appointed Lecturer on Laryngology in the University of Minnesota and held that position for many years. As time advanced his health deteriorated, and he withdrew more and more from active work. His death took place in 1913.

JOSEPH WILLIAM GLEITSMANN, M.D.

Joseph William Gleitsmann was born July 22d, 1841, at Bamberg, Germany. His father, also a physician, was of a prosperous and influential family. The subject of this memorial received his early education at his birthplace, and at Eichstaedt, and studied medicine at Wurtzburg, Munich, Berlin and Vienna, taking the degree of M.D. at Wurtzburg in 1865, and acting as interne at the city hospital at Bamberg. Later he entered the Medical Corps of the German army and as military surgeon in the war with Austria in 1866, acquitted himself with distinction, receiving from the Emperor at the close of the campaign the order of the Iron Cross. His military service was continued throughout the Franco-Prussian War in 1870, when he again showed marked ability and again received a medal of honor. At the close of the war he accepted a position as ship's surgeon and made a number of interesting voyages. Following this he came to the United States in the early seventies, having taken up the specialty of diseases of the throat and lungs. He settled in Asheville, North Carolina, where he established a sanatarium.

In the early eighties he came to New York and thereafter made that city his home, speedily establishing himself as a specialist of unusual merit and associating himself with leading medical societies and institutions. While at Asheville, in 1880, he was elected a Fellow of the American Laryngological Association. He had already been elected to the Medical and Chirurgical Society of Maryland. After making his residence in New York he became a member of the New York Academy

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of Medicine, the New York County and State Medical Association, the Medical Association of Greater New York, and the German Medical Society.

Dr. Gleitsmann was elected vice-president of the American Laryngological Association in 1901, and its president in 1905, presiding over an unusually successful meeting held at Niagara Falls. In 1885 he was elected Professor of Laryngology and Rhinology at the New York Polyclinic Hospital and Medical School, a position which he held for many years with distinction to himself and credit to the school. He was also Senior Laryngologist and Otologist to the German Dispensary and Laryngologist and Otologist to the German Hospital.

Dr. Gleitsmann was throughout his career a frequent contributor to the literature of his department. His articles were always well in advance of the time, scholarly and scientific. His addresses also were of a high order of excellence. During the earlier period of his practice he wrote mainly upon subjects connected with tuberculosis, but soon extended the scope of his studies until they covered the whole field of laryngology.

In the department of original invention he showed much ingenuity, his cutting laryngeal dilator, for example, being quite different in design from anything that had preceded it, and admirably adapted to its purpose.

Dr. Gleitsmann participated in several International Congresses, among them those at Berlin in 1890, Moscow in 1897, and Buda Pesth in 1911. Upon the latter occasion he was one of the Honorary Presidents and was appointed a member of the executive committee of the International Congress of Laryngology. Among the German Medical Institutions of New York he maintained a high position. He was an honored member of the Liederkranz and of other German societies and for many years a trustee of the German Medical Society of New York. In this capacity he shared the responsibility of caring for the funds devoted to fellow members in distress. No official report was ever required, but it is said of him by his fellow members that he carried out the duties of the position with rare tact, and that he was always ready to extend the kindliest sympathy and the wisest advice.

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Outside of medicine, Dr. Gleitsmann was a scholar, a man of extensive reading and of considerable appreciation of art. Above all recreations he was an intense lover of nature. His grand passion in this direction was mountaineering, and there were few places in the Swiss Alps or the Austrian Tyrol with which he was not familiar. His ascents were of the most famous; they included the Matterhorn, Mt. Blanc, Ortler and many others. His knowledge of Europe in general made him an invaluable traveling companion while the brightness and geniality of his disposition and the kindness and generosity of his nature caused him to be a most enjoyable one, as the writer, from many delightful experiences had ample opportunity to prove. But as a companion of travel so was he in all the relations of life. Earnest and thorough in all that he undertook, kind and generous to a fault, refined, scholarly, accomplished; a gentleman by nature and at heart a loving and loyal friend.

CHARLES HUNTOON KNIGHT, M.D.

Charles Huntoon Knight, son of Hon. Horatio Gates and Mary Ann (Huntoon) Knight, was born November 22, 1849, in Easthampton, Mass., where his father, at one time Lieutenant-Governor of the State, was a prominent manufacturer. He entered Williams College from Williston Seminary, and was graduated with the class of 1871. While an undergraduate he became a member of the Lambda Chapter of Delta Psi. Among other attainments of his undergraduate days Dr. Knight excelled in athletics. He was proficient in baseball and as an accomplished general gymnast had few equals. His physical development was admirable, and was maintained for many years by regular and systematic exercise. Following his graduation from Williams College he came to New York in the Autumn of 1871 and began the study of medicine at the College of Physicians and Surgeons, under the preceptorship of Dr. Thomas M. Markoe. Receiving the degree of M.D. in March, 1874, after a few months spent in special study, he served a year and a half as interne in the Roosevelt Hospital.

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In the Summer of 1876 he went abroad. At the time of his return the New York Hospital had been removed from the ancient quarters in lower Broadway to its fine new buildings in Sixteenth Street, and Dr. Knight was appointed for six months medical and surgical house officer in charge to help organize the institution and to train the interne staff. In September, 1877, he began private practice, and the next year became associated with the late Dr. Freeman J. Bumstead.

The department with which Professor Bumstead was associated did not appeal to Dr. Knight. It was not long before he became interested in the diseases of the upper air passages. After several years study he determined to relinquish general surgery and to devote himself exclusively to that department. Availing himself of the best opportunities for clinical observation, and reading extensively on the subject he soon proved himself a practitioner and an authority of the first rank. He was possessed of quick and accurate perception, splendid judgment and remarkable manual dexterity. His contributions to the literature of laryngology and rhinology were of the highest order of scientific merit, original, reliable and scholarly, while as a master of style in the use of language he had few equals. No wonder therefore that he began to attract the attention of the medical profession, not only of his own city, but of the world, and to found the basis of a reputation which grew with steady progress throughout the active years of his professional life.

In addition to his other duties Dr. Knight served as Lecturer on Diseases of Nose and Throat in the New York Polyclinic Medical School and Hospital from 1888 to 1890. He held the chair of Professor of Laryngology in the New York Post-Graduate Medical School, from 1892 to 1898, when he was elected Professor of Diseases of the Throat and Nose to the medical department of Cornell University, which position he held until 1910. He was surgeon to the throat department of the Manhattan Eye and Ear Hospital, and Consulting Laryngologist to St. Luke's Hospital, Bayonne, N. J.

Among the medical societies in which Dr. Knight maintained active membership were the New York Academy of Medicine,

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the American Academy of Medicine, the American Laryngological Association, of which he became a Fellow in 1885, secretary from 1889 to 1896, and president in 1896-97; the American Medical Association, the Therapeutic Society, New York Pathological Society, the Hospital Graduates Club and the Societies of the Alumni of the New York and Roosevelt Hospitals. He was a member of the University Club of New York and of the Sons of the Revolution.

Besides frequent articles and contributions to publications of various medical societies, Dr. Knight wrote: "A Yearbook of Surgery for 1883." His text-book upon "Diseases of the Nose, Throat and Ear, 1903," of which several editions were published, the latest in 1910, is one of the very best of its kind.

He was married to Mrs. Lucy Tolford Mackenzie, of New York, on June 28, 1893, who survives him.

Dr. Knight was not only a brilliant physician and writer, but a man of wide and liberal culture. A lover of art in all forms, he excelled especially as a musician. Possessed of good vocal ability, he was for many years an active and influential member of the Mendelssohn Glee Club of New York, and at one time its president. He was also an expert performer upon the violoncello. The chamber concerts given at his home will be long remembered by those privileged to hear them. With a thorough training in general medicine and surgery he was an accomplished diagnostician, and a resourceful and highly skillful operator. He invented many useful and ingenious instruments, several of which are not likely to be improved upon. His original contributions to the scientific literature of his specialty, constantly continued over a period of many years, and were numerous and valuable.

As a master in laryngology he maintained the first rank among the distinguished specialists of the world. Much as Dr. Knight's accomplishments as a physician, scientist and gentleman are to be admired, it was not these things which made him one of the best appreciated and most well-beloved of men. Handsome to look upon, glowing with intelligence, gentleness and strength, every line of his countenance reflected the true character of the man. From his undergraduate days,

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through the struggles incident to establishing a high professional position in a great metropolis, in the long period of his strenuously active success, and, finally, throughout the decade of intense suffering which finally terminated his life there was never a moment in which his splendid courage foresook him or his patience, cheerfulness and self-forgetfulness failed. Working diligently, but without ostentation, he has left to us a fine heritage of accomplishment. Better than that, the memory of his character, high-minded, truthful and brave, will be a never-failing example and inspiration.

On April 29, 1913, Dr. Knight died at his residence, 55 East 93d Street, New York City, after an illness endured by him with heroic fortitude for many years.

WILLIAM KELLY SIMPSON, M.D.

On February 6, 1914, following a cerebral hemorrhage, William Kelly Simpson was mustered out of the ranks of our fellowship. Though suddenly stricken, it was, nevertheless, as he had always hoped it might be, without prolonged illness or incapacity, in full possession of all his faculties, with his loved ones near, when the final stroke overtook him.

He was born in Hudson, N. Y., on April 10, 1855, being the youngest of the nine children of George N. and Caroline (McCann) Simpson. His paternal ancestors came to New York State from Virginia. His education was acquired in the school at Hudson, the Episcopal Academy of Connecticut, at Cheshire, and Cornell University, where he obtained the degree of A.B. in 1876. After a year he decided to study medicine and entered the College of Physicians and Surgeons, receiving the degree of M.D. in 1880. Upon graduation he joined the staff of the Presbyterian Hospital, where he served as interne on both the medical and surgical divisions until October, 1882. In that same month he married Miss Anna Farrand, also of Hudson, New York, and settled in East 71st Street. At first he undertook a general practice, but soon became interested in diseases of the nose and throat, this largely through the influence of that great specialist and teacher, Dr. Clinton Wagner, of New York.

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From the first Dr. Simpson identified himself with various dispensaries and was attending surgeon to the throat departments of the Northern Dispensary and the Metropolitan Throat Hospital, and assistant surgeon in the throat department of the Presbyterian Hospital Dispensary, also serving as attending physician to the out-door department of the New York Foundling Hospital. It was here that he became associated with the late Dr. Joseph O'Dwyer in his work on intubation, and he performed the first intubation in America on an adult for the treatment of laryngeal diphtheria. What is far more important, he also was the first to advocate intubation in chronic stenosis of the larynx. He was appointed instructor in laryngology in the New York Post-Graduate Medical School and Hospital and attending surgeon to the nose and throat departments of the New York Eye and Ear Infirmary, and continued as such until these departments were dropped from the latter institution.

In 1887 he became one of the assistant surgeons in the nose and throat department of the Vanderbilt Clinic, and in 1898 was appointed chief of clinic and instructor in laryngology in the College of Physicians and Surgeons. On the retirement of Professor George M. Lefferts in 1904, he succeeded to the Professorship of Laryngology, which position he held at the time of his death. He was consulting laryngologist to the Presbyterian Hospital, the Seton Hospital, the St. John's Hospital at Yonkers and the Somerset Hospital in Somerville, New Jersey. In 1892 he became a Fellow of the American Laryngological Association. He was also a Fellow of the New York Academy of Medicine and formerly chairman of the section in laryngology of the Academy, and a member of the Hospital Graduates Club. For a number of years he was secretary of the delegates to the Congress of Physicians and Surgeons, representing the American Laryngological Association.

Among his many attainments he was devotedly fond of music, and for a long time was a member of the Musurgia Society. His ability in this direction as well as his lovable, whole-souled personality made him much sought after on all

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social occasions, and numerous organizations welcomed him as a valuable addition to their list of members. He carried into his professional work the same sunny, hopeful, helpful characteristics which were so much a part of him, making him a beloved physician, an enthusiastic, effective lecturer and teacher, and a lucid and sane writer and thinker in the work of the specialty to which he devoted himself. It is given to few men in this world to have made and kept so many friends, professional and lay, as did he, and to still fewer men is it granted to have their death cause such genuine deep-hearted sorrow. His wife, a daughter and a son survive him.

In speaking of what he accomplished in laryngology, he was perhaps best known by his work as a teacher, by what he did to develop the art of adult intubation, and by the discovery of the use of the Bernay's sponge in the control of epistaxis and in other nasal conditions.

He was an enthusiastic Fellow of the Association, contributing much and often to its scientific work, and was the life and moving spirit of the more informal proceedings of our annual gatherings, and though we admire him for the splendid work which he did so ably in all the varied activities of his professional and private life, and though we revere him for the purity and uprightness of his character, yet we can never for a moment forget him as a companion and friend. What words can add one iota to the silent tribute which all unbidden each of our hearts will always pay to the fond memory of one of the sunniest, sweetest natures which was ever given to man. This memory of him is so beautiful, satisfying and perfect a picture that to attempt to say more might be but to mar it.

H. L. S.

ERNEST LORENZO SHURLY, M.D.

Ernest Lorenzo Shurly, M.D., was born in the city of Buffalo, New York, June 11, 1845. His early education was gained at Waukesha, Wis.; Rochester, N. Y., and Buffalo. Having at an early age determined to become a physician he matriculated at the Medical Department of the University of Buffalo

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and received the degree of M.D. from that institution in 1866. Following a regular term as interne at the Buffalo General Hospital he entered the Medical Corps of the United States Army with service in the Indian campaign of the late 60's, in the course of which he gave evidence of unusual professional ability, and on several occasions distinguished himself for personal bravery. His military experience terminated with the Yellowstone expedition of 1870. Returning East he practiced general medicine for two years at Manistee. In 1872 he moved to Detroit, Michigan, which city became his permanent home. He soon associated himself with the Detroit College of Medicine, in which institution in 1873 he became instructor in Minor Surgery, and following that lectured on the Practice of Medicine and on Materia Medica. Later he occupied at various times the Professorships of Materia Medica, Clinical Medicine and Laryngology, which later he himself established. He was also Vice-President of the Faculty.

In addition to his work as a teacher he was actively connected with the Harper Hospital, St. Luke's Hospital, St. Mary's Hospital and the Woman's Hospital, all of Detroit. Possessed of rare executive ability, Dr. Shurly's value in the community was quickly appreciated and his services eagerly utilized. Thus, when the Harper Hospital was modernized and enlarged, Dr. Shurly undertook the task of its complete reorganization, thoroughly fitting himself in all that pertained to hospital management, and as chief of staff devoting himself with great energy and patience to the medical and the executive work of the institution, both of which he raised to the highest degree of efficiency.

So many were his activities and so indefatigable his energy in promoting them that in trying to record his life work one can do the subject but imperfect justice. He was an admirable instructor, clear, direct and impressive, sparing no pains to impart the knowledge at his command and sharing an interest in the progress and welfare of his classes which called forth their best efforts and awakened their enthusiastic regard for himself. To young physicians he was a devoted and much

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beloved friend. His best advice and assistance were always at their disposal. No wonder that his help was eagerly sought, for there could have been no wiser counsellor or more generous patron.

In the realm of practical medicine and surgery he was an ardent student, an advanced thinker and a practitioner of no ordinary genius, always marching in the vanguard of progress. Dr. Shurly was the father of thoracic surgery in the Middle West. As an operator in this field he possessed remarkable skill and this, combined with his superior judgment, secured for his work unusual success. He was also one of the first in the world to use electricity in the treatment of diseases of the nose and pharynx. For the application of the galvano cautery in this department he devised a complete series of instruments, some of which have not been surpassed in excellence. His literary contributions to the subject are original and highly instructive.

In the crusade against tuberculosis in the United States Dr. Shurly was a pioneer. Through his instrumentality the first camp in Michigan for the treatment of that disease was established at Eloise, Wayne County. Among the first to engage in such work, he maintained at his own expense an experimental laboratory at the Harper Hospital and at his residence built another laboratory for animal experimentation in the study of tubercular disease. The day will never be forgotten when his three monkeys, each one the subject of most interesting and valuable studies in tuberculosis, escaped from confinement into the tree tops of the city only to be captured after a pursuit extending over forty-eight hours, which threw Detroit into an uproar of amusement and apprehension. Amusement at the episode and apprehension lest the result of precious experiments should be lost. His contributions to this department were important and gained world wide and well deserved credit.

The literary work of Dr. Shurly covers an extensive field. This, however, is his report of it. "Small Book on Phthisis Pulmonalis" (1883). Translation, Carl Michel, "On the Nasal Pas-

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sages" (1884). "Treatise on Diseases of the Nose and Throat" (1900). Address on Medicine, American Medical Association (1892), and various papers too numerous to mention, I fear. His style was clear and scholarly, his statements accurate, and his personal observations, based upon a wide and wonderfully well utilized clinical experience, were exceptionally valuable. From the beginning he exercised painstaking care in the study of his cases. In particular he devoted much time to the securing of an exhaustive history, himself recording the facts in full detail. Of the physical examination he preserved minute notes, his records being a clear and precise statement of the condition. Even in the busiest periods of his practice his history taking was scrupulously adhered to. In consequence of this the welfare of his patients was secured and an immense volume of material provided for his literary work. Dr. Shurly was a member of the American Laryngological Association, its Vice-President in 1881 and its President in 1884; the American Medical Association, Chairman of its Section in Laryngology and Otology; the American Climatological Association; the American Microscopical Association; the American Historical Association; the Michigan State Medical Society, and of various local societies.

As a citizen, Dr. Shurly was a most important member of his community. In service affecting the public welfare and health he was an intelligent and diligent worker, unsparingly devoting time, energy and means to every worthy cause. In the organization and conduction of many of these interests he was nobly assisted by his wife, who, thoroughly appreciating his worth and sympathizing with his philanthropic aims, was his inspiring and devoted helpmate. He was untiring in his support of laws to advance sanitation, to prevent adulteration of foods and drugs and to restrain the operations of impostors. Throughout his career he was the active enemy of every species of charlatanism and quackery, and his influence upon the medical profession in this direction was a powerful one.

To give an adequate picture of the character and life work of Dr. Shurly is not an easy tack. Versatile, brilliant, energetic, he was at the same time conspicuously modest, self-for-

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getful and brave. Although slight of stature he was great at soul. No danger, physical or moral, ever daunted him, as time and again during his life was made manifest. Wonderfully keen of observation, his appreciation of opportunity was unerring. An untiring worker for humanity, he gave to the world of his very best and that for forty years of splendid service. Those who knew him best feel that a great man has gone from them.

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SECRETARY'S REPORT.

It is the sad duty of the secretary to announce that by death we have lost two of our beloved and distinguished Fellows since the last scientific meeting, Dr. E. L. Shurly, of Detroit, and Dr. Kelly Simpson, of New York. There have been no deaths among the Honorary or Corresponding Fellows so far as the secretary has been able to ascertain. We have elected to the position of Retired Fellowship six of our active members, and to that of Honorary Fellowship one, which thus reduces our Active Fellowship from 88 to 78. The addition of four new Active Fellows brings our total up to 82, thereby allowing the privilege of electing eighteen new Fellows to complete the 100 limit.

We have deviated this year from our previous custom, relative to electing Americans to the position of Honorary Fellowship, and have conferred this honor upon Drs. J. Solis-Cohen, George M. Lefferts and Clinton Wagner, which permits the election of only two other American Honorary Fellows in accordance with the constitution. We have also promoted from corresponding to Honorary Fellowship three of our foreign confreres, Drs. Emerich von Navratil, De La Sota Y Lastra and Sir St. Clair Thomson, making a total of seven Honorary Fellows, which leaves us the privilege of electing eight more.

Letters of condolence were sent in the name of the association to the families of our deceased Fellows, acknowledgment of which was received later by the secretary. Members of our association living in New York and Brooklyn sent a floral tribute in the name of the association and also attended in a body the funeral services of Dr. Kelly Simpson.

The transactions of 1913 were unusually delayed by the neglect of some of the Fellows to send their corrected discussion in shortly after its reception from the reporter. Immediate attention to this matter will obviate future delays in getting out this volume.

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A large number of the letters sent out from the secretary's office were devoted to appeals to the Fellows to send in their corrcted discussion. The total number of letters written from May 10, 1913, to May 21, 1914, amounted to 431, exclusive of circular letters, a large part of which work could be obviated if a ready response was given to the first appeal in regard to association matters.

As is customary all the meetings of the Council are read before the association, but not published in the transactions. In pursuance with this the secretary wishes to add that before the last Council meeting at the Hotel Manhattan, January 10, 1914, there was a general meeting of the association, assembled by a special call by letter, at which a large part of the previously appointed directors, together with other Active Fellows of the association, assembled.

At this meeting the following resolution was made and unanimously carried:

"Resolved, that the directors of the association, or a sufficient number of them be, and they hereby are authorized and directed to make, execute and file, according to law, a supplemental and amended Certificate of Incorporation substantially in the form hereto annexed, and to make, execute and deliver any other papers and documents, and to do any other act or thing that may be necessary to accomplish the purpose of this resolution and perfect the legal incorporation of this association in substantial accordance therewith."

It was also moved, seconded and carried, that ten (10) directors should be elected each year to represent the association, and the following Fellows were elected to constitute the Board of Directors until the next scientific meeting: Doctors Birkett, Bryan, Coakley, Delavan, French, Halsted, Holmes, Johnston, Kyle and Smith, who were the directors elected at the annual scientific meeting, May 9, 1912, held at Atlantic City.

At the Council meeting which followed, the date and place of the annual scientific meeting was determined.

The applications were all acted upon separately and after due consideration those gentlemen who were admitted yester-

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day were selected as the candidates for recommendation to election into the association. The Honorary and Retired Fellows were also acted upon, as has already been presented to the association.

The secretary was authorized to acknowledge the work of Dr. Loeb concerning abstract proceedings of the 1913 meeting, and Dr. Mayer was recommended to the association as abstract editor for the next three years.

It was voted that the chairman appoint a committee of three to confer with the committee of the Triological Society concerning the teaching of oto-laryngology. This was accordingly done by the President, who appointed Doctors Mosher, Delavan and Shambaugh.

The question of revision of the constitution was left in the hands of its committee, Doctors Coakley and Smith.

The meeting adjourned.

The second meeting of the Council was held in Atlantic City, Sunday evening, May 24, 1914, at which time Doctors Price-Brown, Porter and De Blois were recommended for the position of Retired Fellowship; for Honorary Fellowship, Dr. Clinton Wagner.

Council also appointed the secretary and the incoming president a committee to confer with secretary and president of other associations and suggest time and place of ensuing annual meeting, such action to be ratified by Council at its meeting in January.

Moved that all action of Council and Association between March 16, 1911, and January 10, 1914, be ratified by vote of the Association.

Librarian's Report.

The librarian has to report that since the last meeting nine unbound volumes and two bound volumes have been added to the library, and a list is herewith appended:

Unbound.

The Bristol Medico-Chirurgical Journal, September, 1913-March, 1914.

The Sei-i-Kwai Medical Journal.

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Onderzoek Naar Hardhoorendheid, Bij Amsterdamsche Schoolkinderen.

Nederlandsche Keel-Neus-En Orheelkundige Vereeniging, 1912-1911.

Eutstellung der Ausseren Nase, Bei Polypen und bei Tropescher Gundu.

Over Het Mechanisme Van den Traanafvoer.

Over den Invloed Van Licht Op Reukstoffen.

Monatsschrift fur Ohrenheilkunde und Laryngo-Rhinologie.

Overgedrukt uit het Geneeskundig Tijdschrift over Nederlandisch-Indie. Deel 53, Afl. 4.

Bound.

Eutstehung und Entwickelung der Laryngoskopie, Prof. E. von Navratil.

Fifteenth report Michigan Academy of Science, 1913.

Respectfully submitted,

J. H. BRYAN, Librarian.

Treasurer's Annual Statement for Year Ending May 15, 1914.

Balance from old account	$53.02
Sale of dinner tickets	258.00
Extra assessment, 1913	410.00
Dues collected	1,290.00
Sale of transactions	28.20
Interest on deposits	1.59
Total	$2,040.81

Annual dinner, 1913	$277.00
Stenographer, 1913 meeting	110.00
Secretary's office expenses	48.40
Transactions and mailing, etc	652.98
Paper, printing, postage, etc. (secretary)	115.13
Dr. Mayer, ozaena investigation	66.25
Flowers, Dr. C. H. Knight's funeral	15.00
Printing, postage, stenographer (treasurer)	13.66
Certificates, delegates to International Congress	8.50
Collecting checks	2.83
By balance in bank	731.06
Total	$2,040.81

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Assets of Association.

Invested		
DeRoaldes Prize Fund	$500.00	
Accrued interest to Feb. 1, 1914	137.21	
		$637.21
Current.		
Unpaid dues	$205.00	
Bank balance	731.06	
		936.06
Total assets		$1,573.27

Liabilities, none.

Respectfully submitted,

J. PAYSON CLARK, Treasurer.

Atlantic City, May 25, 1914.

Audited and approved,

J. M. INGERSOLL,

BURT R. SHURLY.

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EXECUTIVE SESSION.

Held Monday, May 25, 1914.

There were elected to the position of Honorary Fellowship (Foreign) Doctors Emerich von Navratil, De La Sota Y Lastra, and Sir St. Clair Thomson; (American) Doctors J. Solis Cohen, George M. Lefferts and Clinton Wagner.

To Retired Fellowship there were elected, Doctors Thomas Amory DeBlois, J. Price-Brown, Samuel W. Langmaid, Beverly Robinson, J. W. Gleitsmann and William Porter.

To Active Fellowship there were elected, Doctors Robert Levy, George Fetterolf, John E. Mackenty and Carl E. Munger.

Dr. Emil Mayer was elected Abstract Editor for the ensuing year.

Dr. D. Bryson Delavan was elected Official Biographer and Historian of the Association.

The following officers were elected for the ensuing year:

President—Dr. Alexander W. MacCoy.

First Vice-President—Dr. Clement F. Thiesen.

Second Vice-President—Dr. Lewis A. Coffin.

Secretary—Dr. Harmon Smith.

Treasurer—Dr. J. Payson Clark.

Librarian—Dr. Joseph H. Bryan.

As Councillors, the above and Doctors Herbert S. Birkett, Thomas Hubbard, D. Braden Kyle and George A. Leland.

At a Business Meeting of the Association, held Tuesday, May 26, 1914, the Committee on the Revision of Articles of Incorporation and the New Constitution presented their report. It was moved and carried that the report be received, printed and submitted to each Fellow of the Association for adoption at its next Annual Meeting in 1915.

The Committee on Publication reported favorable progress and were continued in their capacity. Dr. George E. Shambaugh, chairman.

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The Committee on Tonsil Investigation was continued likewise with Dr. George L. Richards as chairman.

The De Roaldes Prize Fund Committee was also continued with Dr. D. Bryson Delavan as chairman.

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LIST OF ACTIVE FELLOWS.

1915.

1906. Ballenger, William L., Columbus Memorial Building, Chicago, Ill.
1908. Barnhill, John F., 328 Delaware St., Indianapolis, Ind.
1904. Berens, T. Passmore, 35 Park Ave., New York.
1893. Birkett, Herbert S., 252 Mountain St., Montreal.
1892. Brown, Moreau R., 34 Washington St., Chicago, Ill.
1891. Bryan, Joseph H., 818 17th St., Washington, D. C.
1913. Butler, Ralph, 1824 Chestnut St., Philadelphia, Pa.
1889. Casselberry, William E., 15 E. Washington St., Chicago, Ill.
1896. Chappell, Walter F., 7 E. 55th St., New York.
1897. Clark, J. Payson, 71 Marlborough St., Boston, Mass.
1902. Coakley, Cornelius G., 53 West 56th St., New York.
1899. Cobb, Frederic C., 11 Marlborough St., Boston, Mass.
1905. Coffin, Lewis A., 156 West 58th St., New York.
1913. Coffin, Rockwell A., University Club, Boston, Mass.
1893. Coolidge, Algernon, Jr., 613 Beacon St., Boston, Mass.
1913. Dabney, Virginius, 1633 Connecticut Ave., Washington, D. C.
1881. Delavan, D. Bryson, 40 East 41st St., New York.
1892. Farlow, John W., 234 Clarendon St., Boston, Mass.
1914. Fetterolf, George E., 134 S. 20th St., Philadelphia, Pa.
1901. Freeman, Walter J., 1832 Spruce St., Philadelphia, Pa.
1905. Freer, Otto T., 34 Washington St., Chicago, Ill.
1879. French, Thomas R., 150 Joralemon St., Brooklyn, N. Y.
1897. Frothingham, Richard, 616 Madison Ave., New York.
1909. Getchell, Albert C., 6 Linden St., Worcester, Mass.
1907. Gibb, Joseph S., 1907 Chestnut St., Philadelphia, Pa.
1913. Goldstein, Max, 3858 Westminster Place, St. Louis, Mo.
1898. Goodale, Joseph L., 258 Beacon St., Boston, Mass.

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1905. Grayson, Charles P., 251 South 16th St., Philadelphia, Pa.
1906. Greene, D. Crosby, Jr., 483 Beacon St., Boston, Mass.
1905. Halstead, Thomas H., 831 University Block, Syracuse, N. Y.
1896. Hardie, T. Melville, 34 Washington St., Chicago, Ill.
1903. Harris, Thomas J., 104 East 40th St., New York.
1878. Hartman, Jacob H., 5 West Franklin St., Baltimore, Md.
1888. Hinkel, F. Whitehill, 581 Delaware Ave., Buffalo, N. Y.
1907. Holmes, Christian R., 8 East 8th St., Cincinnati, Ohio.
1893. Hope, George B., 159 West 72d St., New York.
1895. Hopkins, Frederick E., 25 Harrison Ave., Springfield, Mass.
1895. Hubbard, Thomas, 515 Nicholas Building, Toledo, Ohio.
1878. Ingals, E. Fletcher, 15 E. Washington St., Chicago, Ill.
1904. Ingersoll, John M., 1021 Prospect Ave., Cleveland, Ohio.
1907. Jackson, Chevalier, 1018 Westinghouse Building, Pittsburgh, Pa.
1878. Johnston, Samuel, 204 West Monument St., Baltimore, Md.
1898. Kyle, D. Braden, 1517 Walnut St., Philadelphia, Pa.
1894. Leland, George A., 354 Commonwealth Ave., Boston, Mass.
1914. Levy, Robert, Metropolitan Bldg., Denver, Col.
1913. Loeb, Hanau W., 537 North Grand Ave., St. Louis, Mo.
1897. Logan, James E., 1208 Wyandotte St., Kansas City, Mo.
1888. Lowman, John H., 1807 Prospect Ave., S. E. Cleveland, Ohio.
1911. Lockard, Lorenzo B., Metropolitan Bldg., Denver, Colo.
1886. Mac Coy, Alexander W., 216 South 15th St., Philadelphia, Pa.
1914. Mackenty, John E., 43 West 54th St., New York.
1883. Mackenzie, John N., 605 Washington Place, Baltimore, Md.
1898. Makuen, G. Hudson, 1627 Walnut St., Philadelphia, Pa.
1896. Mayer, Emil, 40 East 41st St., New York.
1899. McKernon, James F., 62 West 52d St., New York.

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1918. McKimmie, Oscar A. M., 1330 Massachusetts Ave., N. W., Washington, D. C.
1904. Mosher, Harris P., 828 Beacon St., Boston, Mass.
1901. Myles, Robert C., 46 West 38th St., New York.
1914. Munger, Carl E., Waterbury, Conn.
1903. Packard, Francis R., 304 South 19th St., Philadelphia, Pa.
1906. Pierce, Norval H., 31 Washington St., Chicago, Ill.
1908. Randall, B. Alexander, 1717 Locust St., Philadelphia, Pa.
1903. Renner, W. Scott, 341 Linwood Ave., Buffalo, N. Y.
1897. Rhodes, J. Edwin, 100 State St., Chicago, Ill.
1884. Rice, Clarence C., 123 East 19th St., New York.
1905. Richards, George L., 84 North Main St., Fall River, Mass.
1902. Richardson, Charles W., 1317 Connecticut Ave., Washington, D. C.
1879. Roe, John O., 44 Clinton Ave. South, Rochester, N. Y.
1913. Roy, Dunbar, Grand Opera House, Atlanta, Ga.
1907. Shambaugh, George E., 100 State St., Chicago, Ill.
1909. Shurly, Burt R., 32 Adams Ave. West, Detroit, Mich.
1909. Sluder, Greenfield, 3542 Washington Ave., St. Louis, Mo.
1908. Smith, Harmon, 44 West 49th St., New York.
1911. Stout, George C., 1611 Walnut St., Philadelphia, Pa.
1889. Swain, Henry L., 232 York St., New Haven, Conn.
1903. Theisen, Clement F., 172 Washington Ave., Albany, N. Y.
1892. Thrasher, Allen B., The Groton, 7th and Race Sts., Cincinnati, Ohio.
1892. Wagner, Henry L., 518 Sutter St., San Francisco, Cal.
1892. Watson, Arthur W., 126 South 18th St., Philadelphia, Pa.
1908. Wilson, J. Gordon, 104 South Michigan Ave., Chicago, Ill.
1906. Winslow, John R., The Latrobe, Charles and Reade Sts., Baltimore, Md.
1905. Wood, George B., 129 South 18th St., Philadelphia, Pa.

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1890. Wright, Jonathan, N. Y. Post Grad. Med. School, 20th St. and 2d Ave., New York.

Honorary Fellows.

1910. Chiari, Ottokar Von, Bellariastrasse 12, Vienna, Austria.
1878. Cohen, J. Solis, 1824 Chestnut St., Philadelphia, Pa.
1890. Lastra, De La Sota Y., 7 Calle De Torqueros, Seville, Spain.
1878. Lefferts, George M., Crotona, N. Y.
1910. Massei, F., 4 Piazza Municipio, Naples, Italy.
1910. Moure, E. J., 25 Cours du Jardin Public, Bordeaux, France.
1910. Navratil, Emerich von, iv Rigyoten, Buda-Pesth, Hungary.
1910. Semon, Sir Felix, Rignall, Great Missenden, Bucks, England.
1902. Thomson, Sir St. Clair, 64 Wimpole St., London W.. England.
*1878 Wagner, Clinton, London, England.

Corresponding Fellows.

1880. Bruns, Paul Von, Tubingen, Wurtemberg, Germany.
1901. Collier, Mayo, 145 Marley St., Cavendish Square, London W., England.
1913. Denker, Alfred, Martinsberg 11, Halle, Germany.
1893. Desvernine, C. M., Cuba 52, Havana, Cuba.
1913. Eicken, Carl von, Friedrichstrasse 14, Giessen, Germany.
1901. Grant, Dundas, 18 Cavendish Square, London W., Eng.
1902. Heymann, Paul, 60 Lutzowstrasse, Berlin W., Germany.
1908. Killian, Gustav von, Lutzow Ufer 3, Berlin W. 10, Germany.
1892. Krause, H., San Remo, Italy.
1902. Lermoyez, Marcel, 20 Rue de la Boetie, Paris, France.
1897. Luc, H., 54 Rue de Varenne, Paris, France.
1903. McBride, P., 16 Chester St., Edinburgh, Scotland.

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1896. MacDonald, Greville, 85 Harley St., Cavendish Square, London W., England.
1894. MacIntyre, John, 179 Bath St., Glasgow, Scotland.
1896. Mygind, Holger, 31 Havnegade, Copenhagen, Denmark.
1901. Natier, Marcel, 10 Rue de Ballachasse, Paris 7e, Paris France.
1903. Onodi, A., o'Uctza 12, Buda-Pesth, Hungary.
1910. Rethi, Leopold, IX Garnisongasse 7, Vienna, Austria.
1894. Sajous, C. E., 2043 Walnut St., Philadelphia, Pa.
1896. Schmiegelow, Ernest, 18 Norregade, Copenhagen, Denmark.
1903. Tilley, Herbert, 72 Harley St., Cavendish Square, London W., England.
1913. Turner, Logan, 27 Walker St., Edinburgh, Scotland.
1901. Wingrave, Wyatt, 11 Devonshire St., Portland Place, London W., England.
1894. Wolfenden, R. Norris, 76 Wimpole St., Cavendish Sq., London W., England.

Retired Fellows.

1878. Bosworth, Francke H., 41 Park Ave., New York.
1901. Brown, J. Price, 28 College St., Toronto, Can.
1882. DeBlois, Thomas Amory, 48 Gloucester St., Bostou, Mass.
*1880. Gleitsmann, Joseph W., 616 Madison Ave., New York.
1880. Langmaid, Samuel W., 143 Newbury St., Boston, Mass.
1903. Lincoln, William, 210 Lennox Bldg., Cleveland, Ohio.
1878. Porter, William, 3886 Washington Ave., St. Louis, Mo.
1893. Roaldes, Arthur W. De, 624 Gravier St., New Orleans, La.
1878. Robinson, Beverly, 42 West 37th St., New York.

*Deceased.

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PAST OFFICERS.

Presidents.

(Year of Election.)

1879. Louis Elsberg.
1880. J. Solis-Cohen.
1881. F. I. Knight.
1882. G. M. Lefferts.
1883. F. H. Bosworth.
1884. E. L. Shurly.
1885. Harrison Allen.
1886. E. Fletcher Ingals.
1887. R. P. Lincoln.
1888. E. C. Morgan.
1889. J. N. Mackenzie.
1890. W. C. Glasgow.
1891. S. W. Langmaid.
1892. M. J. Asch.
1893. D. B. Delavan.
1894. J. O. Roe.
1895. W. H. Daly.
1896. C. H. Knight.
1897. T. R. French.
1898. W. E. Casselberry.
1899. Samuel Johnston.
1900. H. L. Swain.
1901. J. W. Farlow.
1902. J. H. Bryan.
1903. J. H. Hartman.
1904. C. C. Rice.
1905. J. W. Gleitsmann.
1906. A. W. de Roaldes.
1907. H. S. Birkett.
1908. A. Coolidge, Jr.
1909. J. E. Logan.
1910. D. Braden Kyle.
1911. James E. Newcomb.
1912. George A. Leland.
1913. Thomas Hubbard.

Vice-Presidents.

1879. F. H. Davis.
1880. W. C. Glasgow, J. O. Roe.
1881. E. L. Shurly, W. Porter.
1882. C. Seiler, E. F. Ingals.
1883. S. W. Langmaid, S. Johnston.
1884. J. H. Hartman, W. H. Daly.
1885. H. A. Johnson, G. W. Major.
1886. E. C. Morgan, J. N. Mackenzie.

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1887. J. N. Mackenzie, S. W. Langmaid.
1888. W. C. Glasgow, C. E. Sajous.
1889. E. Holden, C. E. Bean.
1890. J. O. Roe, J. H. Hartman.
1891. M. J. Asch, S. Johnston.
1892. S. Johnston, J. C. Mulhall.
1893. J. C. Mulhall, W. E. Casselberry.
1894. C. C. Rice, S. H. Chapman.
1895. J. Wright, A. W. de Roaldes.
1896. T. M. Murray, D. N. Rankin.
1897. A. W. MacCoy, H. S. Birkett.
1898. J. W. Farlow, F. W. Hinkel.
1899. T. A. DeBlois, M. R. Brown.
1900. H. L. Wagner, A. A. Bliss.
1901. J. W. Gleitsmann, D. Braden Kyle.
1902. G. A. Leland, T. Melville Hardie.
1903. J. H. Lowman, W. Peyre Porcher.
1904. Thomas Hubbard, W. J. Freeman.
1905. J. L. Goodale, C. W. Richardson.
1906. G. H. Makuen, A. B. Thrasher.
1907. J. P. Clark, J. E. Rhodes.
1908. E. Mayer, F. R. Packard.
1909. C. G. Coakley, H. P. Mosher.
1910. Robert C. Myles, J. M. Ingersoll.
1911. F. C. Cobb, B. R. Shurly.
1912. A. W. Watson, W. Scott Renner.
1913. F. E. Hopkins, George E. Shambaugh.

Secretaries and Treasurers.

1879. G. M. Lefferts.
1882. D. B. Delavan.
1889. C. H. Knight.
1895. H. L. Swain.
1900. J. E. Newcomb.
1911. Harmon Smith.

Treasurer.

1912. J. Payson Clark.

Librarians.

1879. F. H. Bosworth.
1883. T. R. French.
1903. J. H. Bryan.

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PAST MEMBERS.

Honorary Fellows.

*1880. Senor Manuel Garcia, London, England.
*1883. Sir Morell Mackenzie, London, England.
*1907. Leopold von Schroetter, Vienna, Austria.
*1904. B. Fraenkel, Berlin, Germany.

Corresponding Fellows.

*1892. Lennox Browne, London, England.
*1887. A. Gouguenheim, Paris, France.
*1894. Edgar Holden, Newark, N. J.
*1881. Carlo Labus, Milan, Italy.
*1880. Wilhelm Meyer, Copenhagen, Denmark.
*1901. Moritz Schmidt, Frankfort-a-Main, Germany.
*1881. Pugin Thornton, London, England.
*1881. R. Voltolini, Breslau, Germany.
*1880. W. McNeil Whistler, London, England.
‡1881. Sir Felix Semon, Bucks Co., England.
‡1887. E. J. Moure, Bordeaux, France.
‡1892. F. Massei, Naples, Italy.
‡1896. Ottokar Chiari, Vienna, Austria.

Retired Fellows.

*1885. Charles H. Knight, New York City.
*1880. J. W. Gleitsmann, New York City.

Active Fellows.

*1880. Harrison Allen, Philadelphia, Pa.
*1878. Morris J. Asch, New York.
1895. J. E. Boylan, Cincinnati, Ohio.
*1883. C. W. Chamberlain, Hartford, Conn.

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*1882. S. Hartwell Chapman, New Haven, Conn.
1884. S. Solis-Cohen, Philadelphia, Pa.
1880. E. W. Cushing, Boston, Mass.
1878. Ephraim Cutter, West Falmouth, Mass.
*1880. W. H. Daly, Pittsburgh, Pa.
*1878. F. H. Davis, Chicago, Ill.
*1901. E. T. Dickerman, Chicago, Ill.
*1878. Frank Donaldson, Baltimore, Md.
*1878. William Carr Glasgow, St. Louis, Mo.
†1879. Edgar Holden, Newark, N. J.
*1882. Franklin H. Hooper, Boston, Mass.
1882. Frank L. Ives, New York City.
*1878. Hosmer A. Johnson, Chicago, Ill.
*1879. Woolsey Johnson, New York City.
*1880. William C. Jarvis, New York City.
1879. R. H. Kealhofer, St. Louis, Mo.
*1901. Gordon King, New Orleans, La.
*1885. Chas. H. Knight, New York City.
*1878. Rufus P. Lincoln, New York City.
1881. G. W. Major, Montreal, Canada.
1879. Charles McBurney, New York City.
1885. H. Clinton McSherry, Baltimore, Md.
*1881. E. C. Morgan, Washington, D. C.
*1886. J. C. Mulhall, St. Louis, Mo.
1892. T. Morris Murray, Washington, D. C.
*1881. H. Mynter, Buffalo, N. Y.
*1893. James E. Newcomb, New York City.
*1895. J. E. H. Nichols, New York City.
1879. H. K. C. Oliver, Boston, Mass.
1894. William H. Park, New York City.
1892. W. Peyre Porcher, Charleston, S. C.
*1880. D. N. Rankin, Allegheny, Pa.
1881. J. M. Robertson, Detroit, Mich.
1878. Beverly Robinson, New York City.
*1878. T. F. Rumbold, St. Louis, Mo.
†1880. Charles E. Sajous, Paris, France.
*1879. Carl Seiler, Scranton, Pa.
*1893. Charles M. Shields, Richmond, Va.

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1879. Andrew H. Smith, Geneva, N. Y.
1879. Bernhard Tauber, Cincinnati, Ohio.
*1899. Max Thorner, Cincinnati, Ohio.
1888. S. O. Van der Poel, New York City.
*1878. Clinton Wagner, New York City.
1896. Marshall R. Ward, Pittsburgh, Pa.
1879. Whitfield Ward, New York City.
*1886. Benjamin F. Westbrook, Brooklyn, N. Y.
1896. Green V. Woollen, Indianapolis, Ind.
1878. George M. Lefferts, New York City.
1901. Frank Hyatt, Washington, D. C.
*1885. Charles H. Knight, New York City.
*1880. C. E. Bean, St. Paul, Minn.
*1893. Arthur Ames Bliss, Philadelphia, Pa.
*1878. E. L. Shurly, Detroit, Mich.
*1892. William Kelly Simpson, New York City.

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*Deceased. †Corresponding Fellow. ‡Honorary Fellow.

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